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(full report, page 76)

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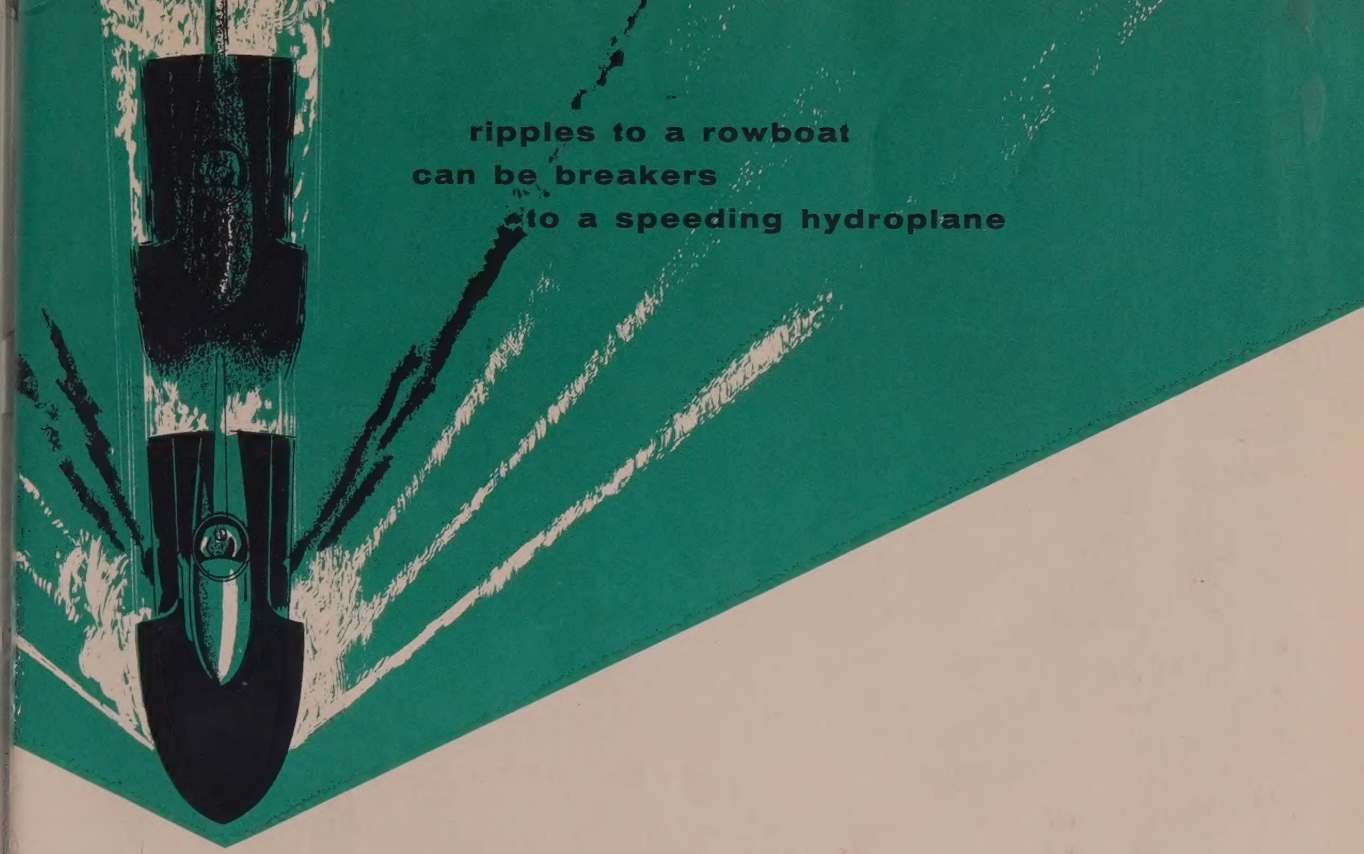

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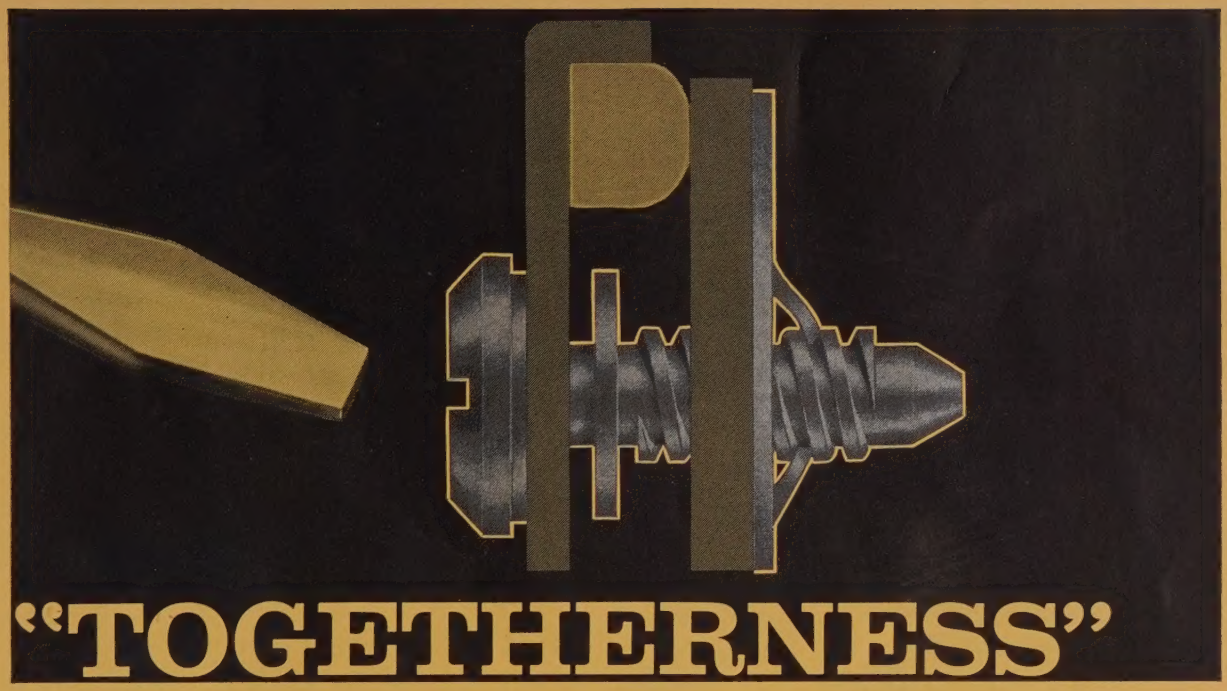

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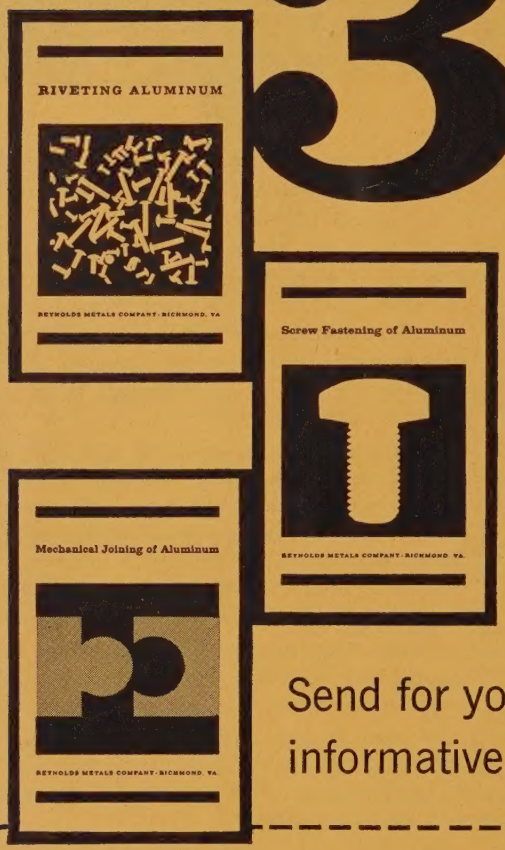
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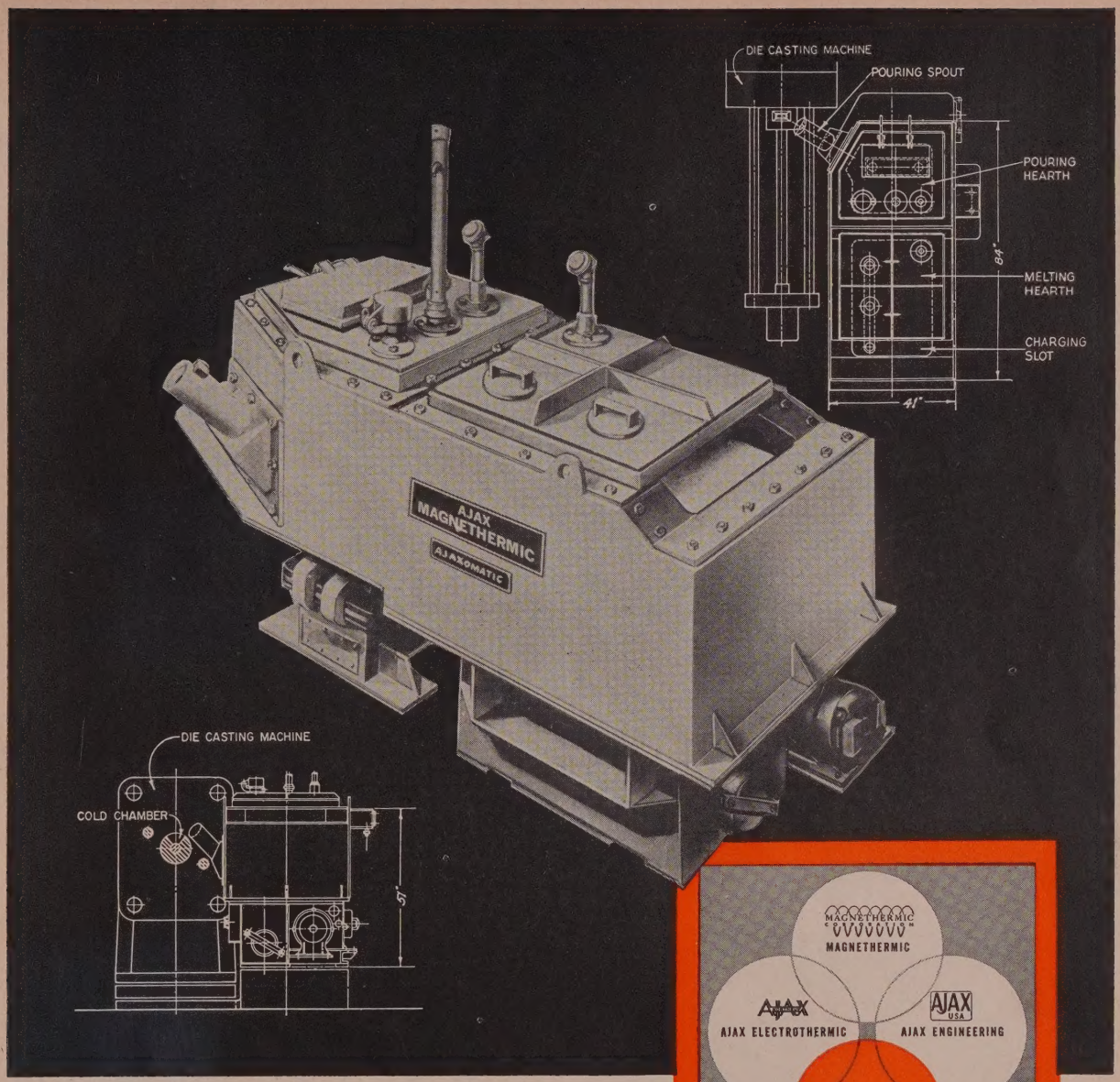
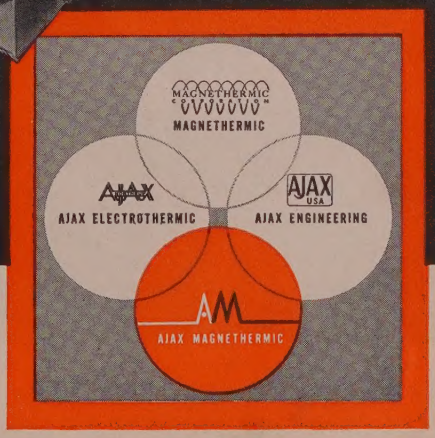


Duplex Ajaxomatic for melting and holding metal for automatic casting operations.



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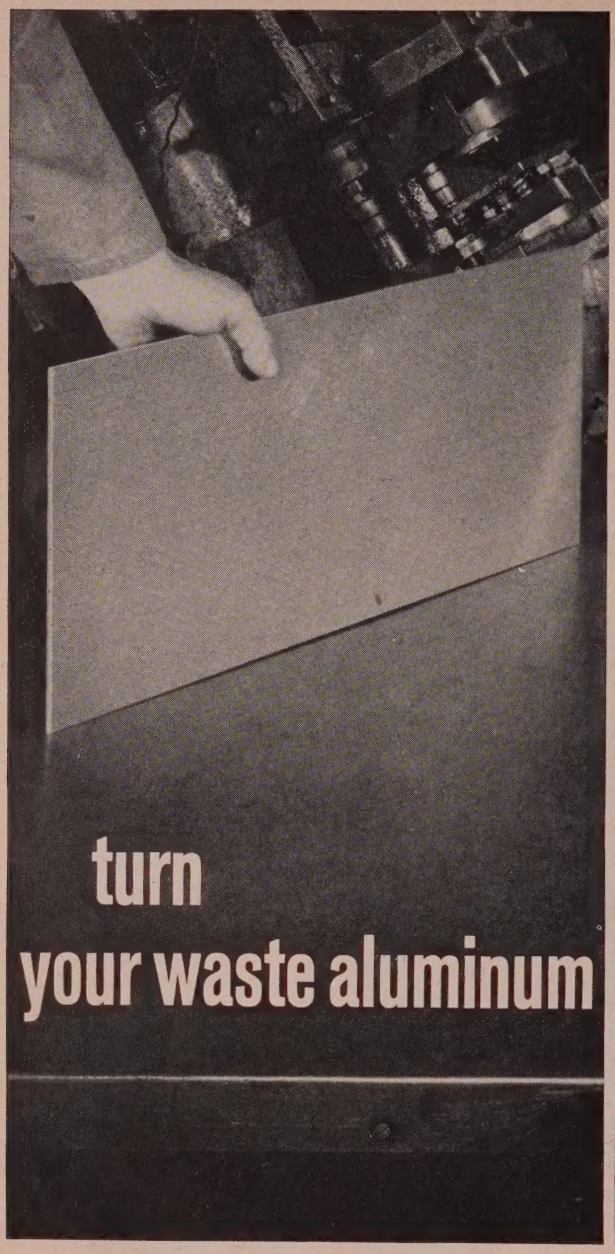

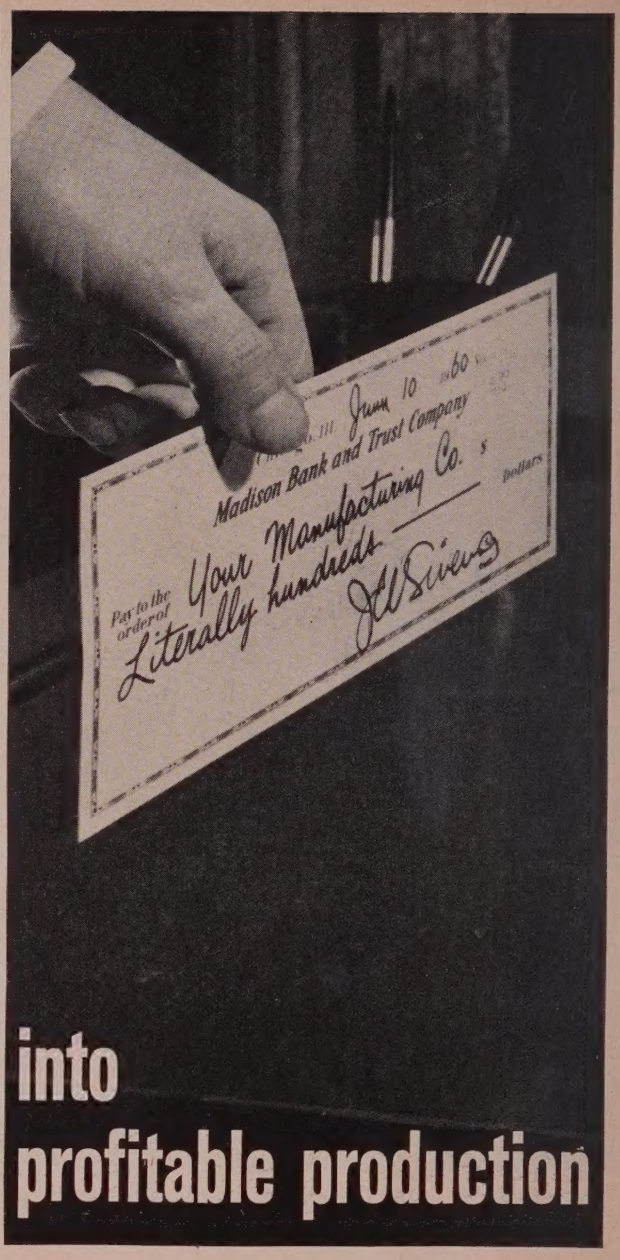

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MODERN METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

ON THE COVER: The long line of covered hopper cars, increasing in size as it rumbles out of sight at the bottom of the page, could symbolize the growing importance of aluminum to the railroads. Perhaps in later years it will be said that aluminum's revitalized railroad market started when The Southern System ordered all those hopper cars, plus 750 huge gondolas. It was a Reynolds Metals Co. sales coup, but at least four, and perhaps all, primary aluminum producers will be vying for the big orders of the future. The illustration is by Reynolds Metals Co.

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Modern Metals has by far the world's largest circulation among light metals fabricators, foundries and product manufacturers who use aluminum, magnesium, and titanium. Circulation: Now over 15,000 copies per month. Acceptance under controlled circulation at Barrington, Ill.

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Modern Metals

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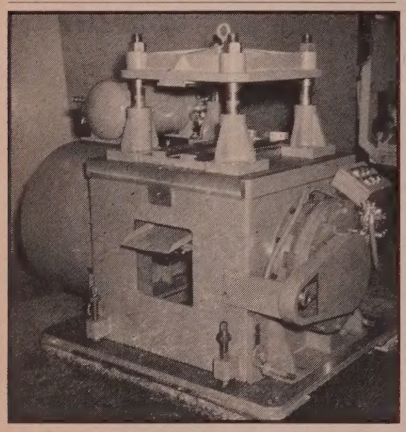

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We would be interested in any standard cases of approximately this size in aluminum, fiberglas or stainless steel. Prices and delivery on small production quantities of 10 or 25 would be appreciated.

Thank you for any information which you may supply.

"J"—New York

MM—If any reader can supply "J" with these containers, we'll be glad to forward all letters.

Wants Aluminum Permanent Mold Equipment

Sirs:

We are advised by the Aluminum Association that you may be able to let us know of American companies manufacturing special purpose apparatus for the production of aluminum die cast squirrel-cage induction motor rotors.

We are thinking particularly of centrifugal and low pressure die casting equipment rather than conventional high pressure die casting machines.

"J"—England

MM—You apparently are after high speed permanent mold casting equipment for the manufacture of aluminum squirrel-cage induction motor rotors.

One company that makes this equipment is:

Permanent Mold Die Co., Inc.
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Hot Dog Sizzler

Sirs:

The writer has developed and has made limited quantities of a new aluminum product—a photo and details of which are attached.

Am seeking a manufacturer of aluminum products by whom this home product could be volume produced and distributed with other products.

The sizzler is made in two models—for the home and for car or boat. It cooks two wieners at a time in three to five minutes. It is made of heavy gauge aluminum alloy and mounted on bakelite legs, with a heavy duty handle. . . .

"J"—Illinois

MM—Anyone desiring to contact the manufacturer write M. W. Thomas Manufacturing Co., 8143 N. Lowell St., Skokie, Illinois.

Those Aluminum Hearings

Sirs:

Your condensation of the recent Yates Congressional hearings on aluminum is an

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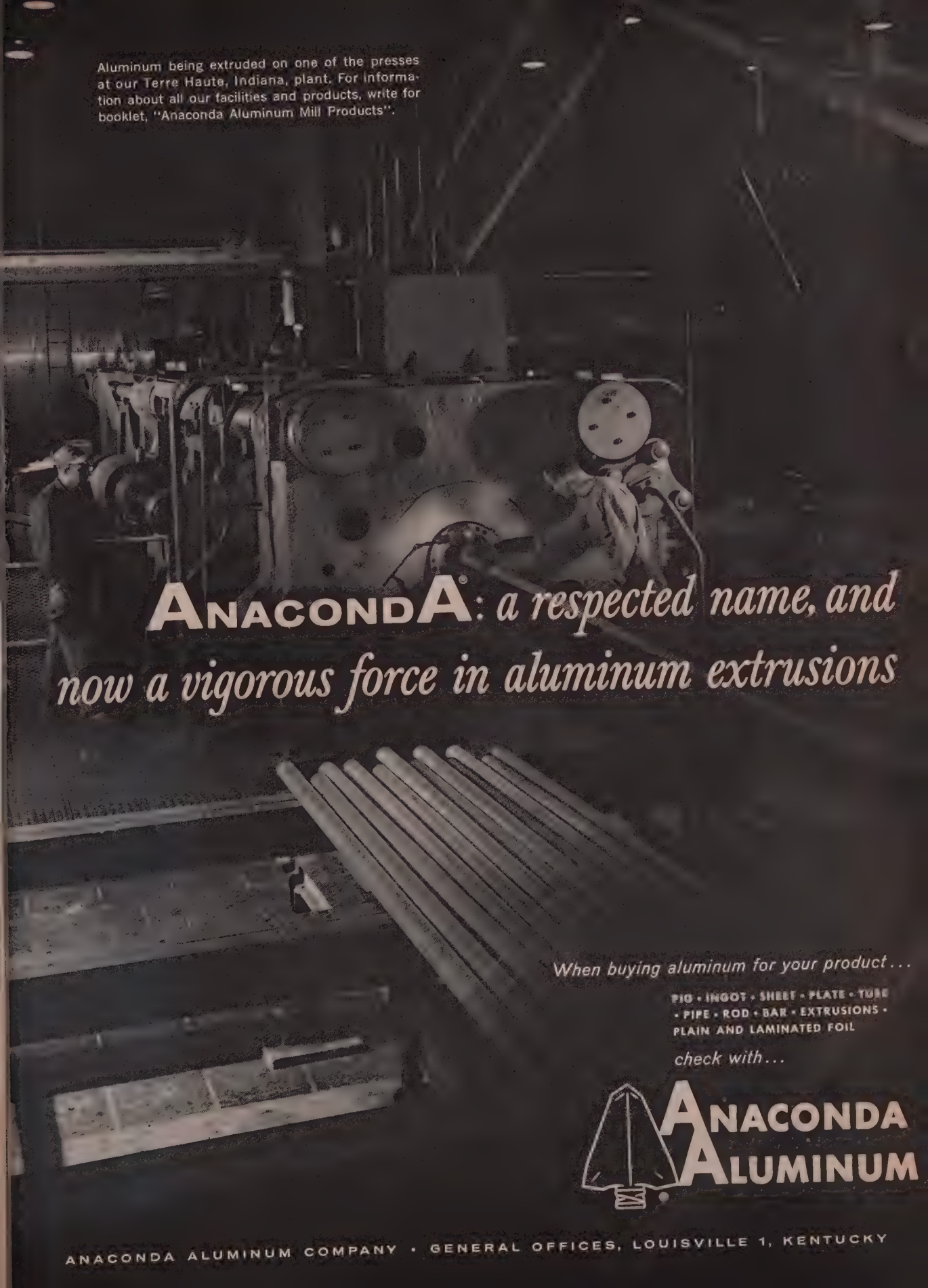

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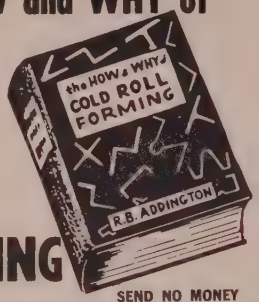

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excellent piece of work. You people do a masterful job of editing the testimony. . . .

I note that the second part will appear in July. If you plan to reprint the two parts, you can put us down for 10 copies.

"J"—Michigan

MM—Part 2 appears in this issue; Part 3 will run in August. In all, our version will be condensed into about 26 pages.

If we get enough orders, we will reprint the whole thing. Copies would be available at $1.00 apiece.

By the way, anybody care to comment on these hearings? We'd like to get any opinions, pro or con. We believe it failed to uncover some major problems confronting the aluminum industry today. For example, see the results of our survey of aluminum extruders, starting on page 30.

We'll welcome your comments.

On Exporting Scrap

Sirs:

Your June issue, dealing with the aluminum hearings, is the most comprehensive report of this Congressional hearing that we have seen anywhere.

We recently sent out a release which indicates that the controversy over aluminum scrap exports is far from over. Here are parts of it:

"A survey . . . has confirmed reports regarding the weak domestic market for aluminum scrap and increasing difficulty of nonferrous scrap metal dealers to find suitable domestic outlets for their supplies at the present time.

"It is fortunate for dealers that there exists a limited export market. . . .

"With all the scrap being exported, the tonnage is still a relatively small percentage of the total shipments. While dealers consider domestic smelters as their principal customers, those tonnages of aluminum scrap that can't be absorbed in the domestic market must be moved through whatever other outlets are available, since it is extremely difficult for dealers to stockpile aluminum scrap because of space problems.

". . . The continued pressure for restrictions on exports of aluminum scrap . . . is ill-timed. . . . Export business is vitally necessary for the economic health of a large segment of our scrap metal industry."

"W"—New York

MM—This note and release came from the National Association of Secondary Material Industries. The group opposes export controls on aluminum scrap—which U. S. aluminum smelters would like to see controlled.

This fight could never be resolved to satisfy both groups. However, with only two prior exceptions since the end of World War II, aluminum scrap has been in good demand domestically. Only piddling amounts have been shipped abroad. At a time like this (when business is lousy), scrap dealers look upon Europe and other areas as welcome markets. The alternative of offering scrap at greatly reduced—and more realistic—prices is obviously not very attractive.

Incidentally, we note that the Commerce Department has once more refused to impose limitations on the export of aluminum scrap, pointing out that although such exports have increased substantially there is "no perceptible scrap shortage, nor is one foreseen in the immediate future." The Department promised to keep the matter under surveillance, however, and to take "proper action should conditions justify it."

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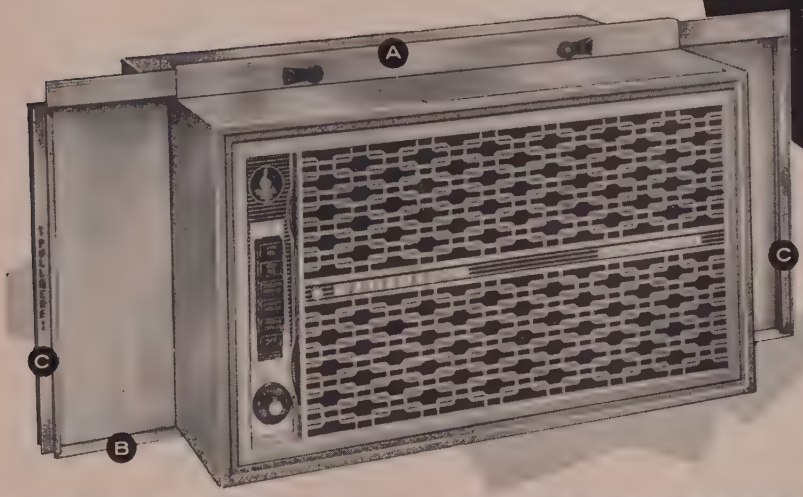

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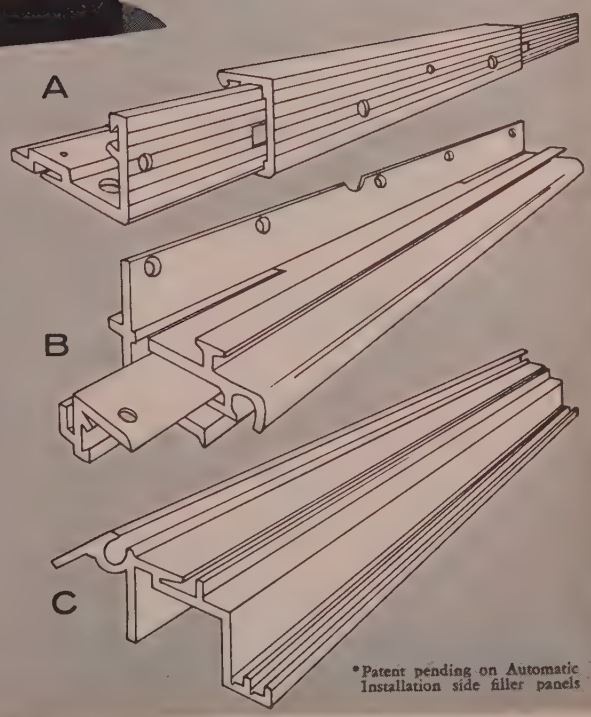

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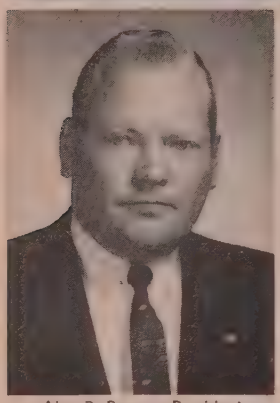

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Here and There

Lower Aluminum Tariffs? » » Independent aluminum siding makers want the Tariff Commission to include aluminum pig, ingot, sheet and coil in the list of materials considered for possible tariff concessions at next September's G.A.T.T. meeting in Geneva. Almost all of the independents use either reroll stock or precoated coiled stock, and they buy perhaps 85% of the material from the big domestic producers. So the Aluminum Siding Association expressed its members' "deep concern with the existing tariff barriers of the U.S. applying to aluminum pig, ingot, sheet and coil produced in other countries." Their wish for lower duties on imported metal is understandable, but we wouldn't "make book" on their chances of getting it. Incidentally, the views of two siding makers are given in Part 2 of our Aluminum Hearings report (starting on page 44).

Furniture Sagged At Mid-Year »» A few weeks ago we grabbed some conflicting reports on the current condition of the furniture industry and headed toward Chicago's Furniture Mart where the summer buyers' session was in progress. Just prior to its opening, Frank S. Whiting, president of the Mart, said: ". . . There has been a recent business upsurge at the retail level. . . . " In oppostion to that, a newspaper report, printed just after the market opened, quoted several retailers as saying they had a good first quarter, but that recent sales had taken a nose-dive, especially in May and early June. One Illinois retailer said: "Although our sales so far in 1960 are ahead of 1959 by 5%, we slipped off sharply in May and it looks like we'll go under year-ago figures in the third quarter." An east coast shop owner said, "We were running ahead of last year by 19% to 20% (until mid-May) then it was like someone pulled a curtain over our heads." Confirmation of these complaints came from a report by Seidman & Seidman, industry accountants, which showed that furniture shipments in May were off 1% from last year. This is compared to an overall 4% increase for the first five months of 1960.

But Things Look Better »» People we talked to, though all manufacturers, said that May and June were slow months. Nevertheless, they were all optimistic and looked for a good second half. Joseph W. McNichols, president of Daystrom, Inc., said his firm is 6% ahead of last year; had hoped for an overall growth of 12%; but now expects sales to be 8% over '59. Paul R. Evenson, general sales manager, Virtue Bros. Mfg. Co., said "things are far from depressed." Most encouraging to him were reports that buying was on the upswing in agricultural areas after a couple of "definitely soft months." Harry Brody, president of Brody Seating Co., found buyers at market "optimistic for the remainder of the year. Quality houses are doing well," he added. "It is the me-tooers—those who do not exist on

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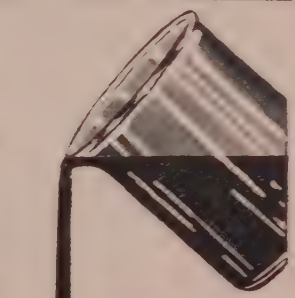

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quality—who are feeling the pinch." Those in the industry who are complaining have only themselves to blame, according to McNichols. "The automotive and housing industries are to be congratulated. They have out-presented, out-educated, out-marketed and out-sold our industry, whose attitude toward the consumer, at best, has been a casual one." He feels manufacturers should promote furniture to the point where consumers recognize well-styled pieces as a "status symbol." Evenson feels the same way. "Business is going to be good because we are going to make it good," he declared. He explained this will result from a coordinated promotional and merchandising effort at the retail level. Predictions for the rest of the year, and 1960 as a whole, are conservative—with an increase of probably 2%. But this is encouraging since 1959, with sales over $4.4 billion dollars, was the industry's top year.

Heretic or Fundamentalist? »» George Romney, the non-conformist president of American Motors, aimed a stiff jab at a practice that has become a mainstay of many American industries. He announced that AMC's Kelvinator appliance division would abandon the "annual model change," and would concentrate on basic improvements. Henceforth, new Kelvinator products will be based on "meaningful" improvements rather than "superficial face-lifts." Starting in 1961, Kelvinator appliances will not carry yearly designations. "Attempts to forcibly outdate products that are meant to have a long and useful life . . . are being questioned by the consumer with increasing intensity," he declared. Asked if he were not preaching heresy, Romney countered: "I thought I was preaching a good old fundamentalism." Maybe he's right. In recent ads, Volkswagen has hammered away at the idea that your five- or six-year-old VW is not obsolete because it looks substantially the same as this year's model. From the last we heard, the German import is doing fine.

A Sick Industry? »» They knew it all along, of course, but independent extruders who attended last month's Chicago meeting of the Aluminum Extruders Council were told that they are a growing force in the overall aluminum picture. Not in so many words, perhaps, but that sums up the message in the off-the-cuff talk by S. M. Blumenreich, Reynolds Metals' director of market research. Blumenreich characterized the extrusion industry's growth rate as "phenomenal," noting that shipments have soared from 126 million pounds in 1946 to 258 million in '50, to 750 million in '55, and to a high of 1,052,000,000 pounds last year. Blumenreich had estimated that extrusion shipments would gain again to 1.2 billion pounds this year, but he revised his estimate downward at this meeting. Now, he figures extruders will ship about the same amount of metal as last year. The statistics lend credence to a facetious remark tossed off at the AEC banquet by Air Master Corp.'s Harold Kapp. He and some fellow extruders were comparing notes on Hawaii vacations. "For members of a sick industry, we seem to live rather well," Kapp observed.

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Here is just a partial list of avenues used by Alcoa to help you sell. Alcoa TV commercials appear regularly on two network TV programs. Radio is used to reach customers when they aren't watching television. Magazines—both consumer and trade—and many other promotional tools for industry support and direct customer support to help you sell your products. There is an element in Market-Maker promotions that will fit your particular selling need.

Brand-conscious consumers know and respect the Alcoa label. And alert retailers constantly feature the label in their advertising and in-store displays to tell customers about the benefits of aluminum products.

If you aren't already making full use of Alcoa Aluminum in your manufacturing operations—or would like more information about Market-Maker promotions and Alcoa's label program, here's your invitation—write Aluminum Company of America, 2076-G Alcoa Building, Pittsburgh 19, Pa.

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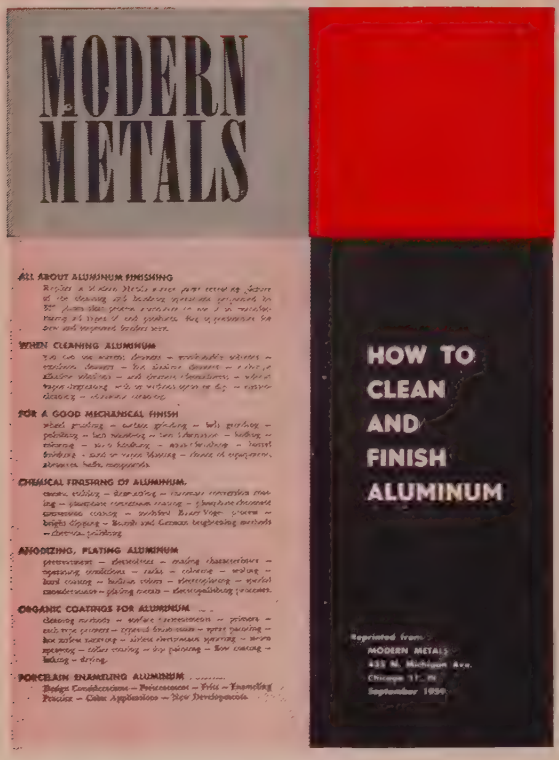

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New Enterprise

Heavy-duty grinding wheel dresser is made of cast aluminum by L. Newman, 1001 24th St., Oakland 7, Calif. Tangential angle dresser is 6 inches long with a ¾-inch diameter shank, has interchangeable cutters and abrasive wheels. The firm says the built-in angle of the cutters eliminates need for a braking device and assures sharp, cool grinding, while eliminating burn checks and flying dead grain.

Dogtags for diabetics may save the life of someone you know. This **identification tag** — made of aluminum — clearly indicates the cause of trouble to those who come to the aid of a diabetic suffering from an overdose of insulin. Symptoms of such an overdose are much like those of drunkeness. Delay in treatment of the true condition could be fatal. Tags urge immediate hospitalization and detail on-the-spot treatment. They are fabricated by John M. Lee, Ligonier, Pa.

A new line of aluminum **chain link fencing** designed for residential use is being test marketed in seven cities by Anchor Post Products Co., 6500 Eastern Ave., Baltimore. The cities are Boston, Albany and Buffalo, N. Y., Richmond and Norfolk, Va., Atlanta and Washington. Every component of the fence is of aluminum.

Republic Foil Inc., producer of **standard purity aluminum foil** for electrical capacitors, is constructing a $750,000, high speed, 4-high rundown strip mill at Danbury, Conn. Initial operation is slated for early 1961. The installation will allow the firm to use reroll stock foil at twice the present thickness.

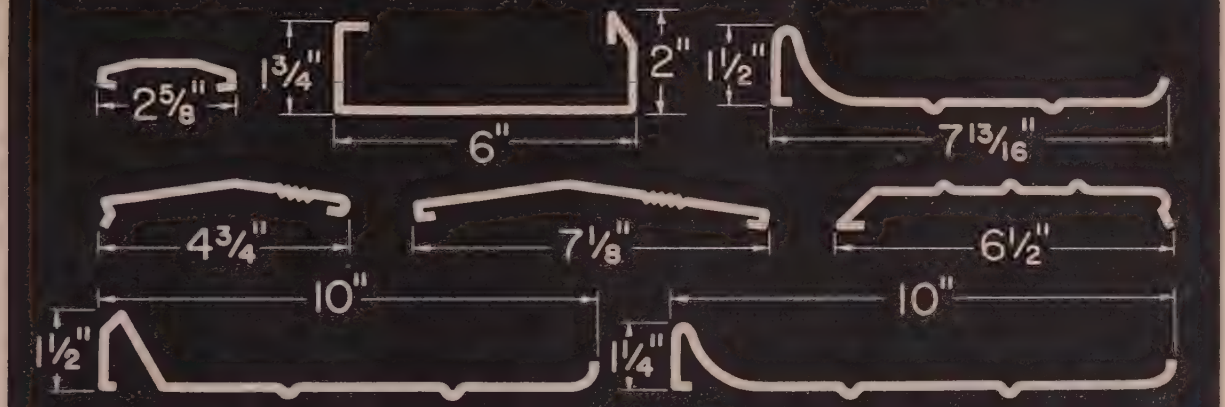
Matched gas lamps to cheerfully illuminate garden, patio or driveway are being fabricated by General Gas Light Co., 204-U N. Park St., Kalamazoo, Mich. One lamp can be wall mounted while the other comes on a spiral pole. All working parts are aluminum with valves made of brass.

A hood for gas or electric ranges has a control panel for its exhaust fan and light. Other features include: Mitered corners, aluminum mesh filter, double light socket. The fan has six 8-inch blades. Fabricator is Stewart Industries Inc., 320 E. St. Joseph St., Indianapolis 2.

Here's a way to get a whirlpool treatment in a backyard pool or bathroom. Jacuzzi Bros. Inc., 1440 San Pablo Ave., Berkeley, Calif., has developed a **Whirlpool Bath** unit weighing only 25 pounds. It is easily placed in a tub to create relaxing, swirling air bubbles. A shell of aluminum encases the driving motor and keeps it dry.

Aluminum step blocks for clamping, used with either plain or step clamps, are a new product of Northwestern Tools, Inc., 117 Hollier Ave., Dayton 3, Ohio. There are nine sizes: Three standard blocks 1-inch wide; three heavy duty blocks 1½-inch wide, three double duty blocks 2-inches wide. Blocks are interchangeable with each other, with all sizes of steel step

ROLL FORM THESE PANELS and GET . . .



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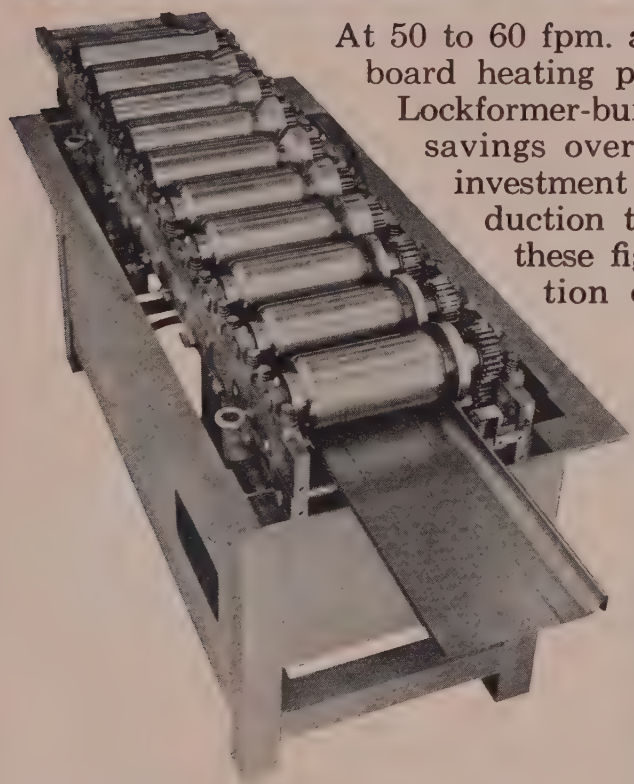

At 50 to 60 fpm. average speeds, all of these baseboard heating panels have been roll formed on Lockformer-built machines at significant cost savings over press brake fabrication. Total investment for machine and one set of production tooling: around $8,000. Compare these figures with your present production costs . . . and check these other reasons why users of Lockformer roll forming machinery produce more, profit more—

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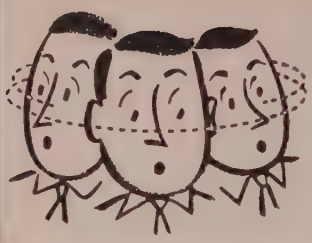

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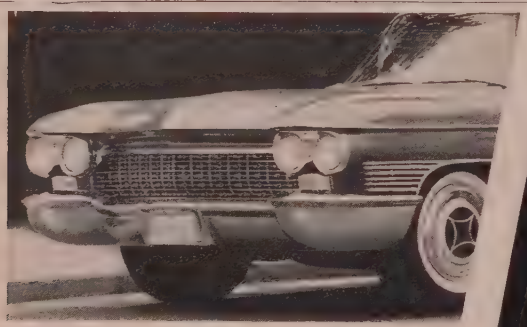

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blocks, and with all sizes of step clamps. They cannot mar or scratch machine tool tables, says the firm.

A roof coating made of rubber and aluminum extends the life of asphalt roofs as much as 15 years, according to United States Rubber Co., 1230 Avenue of the Americas, New York 20. The coating has a base of butyl synthetic rubber with colors formulated with aluminum pigments which also improve the old roof's ability to reflect heat by 15%. The firm also claims the coating is waterproof, will not chip, crack or peel, and that the colors are fade resistant. Coating comes in green, red, white, blue and brown.

Ground has been broken for the new plant of the recently formed Southern Die Casting & Engineering, at High Point, N. C., home of the parent company, Adams-Millis Corp. The new plant and its 10 machines (up to 400-ton capacity) will be ready to produce aluminum and zinc **die castings** by fall. Metallurgist John A. Weber will direct sales and customer relations.

Claiming to be first manufacturer of **aluminum residential siding** in Kansas City is Peerless Products Co., 4319 Independence Ave., who is now making plans to market its product in that area. The company will offer siding in two basic designs — 8-inch clapboard horizontal siding, and vertical siding featuring trapezoidal corrugations every 12 inches. Six colors — white, green, gray, turquoise, yellow and pink — come in sheenless baked enamel. The product will also be marketed through warehouse distributors in St. Louis, Oklahoma City, and Denver.

It takes about three minutes for the hunter or skeet shooter to alter his shotgun gauge if he uses Ekwall tubes made by Ekwall Corp., P. O. Box 307, Monrovia, Calif. The anodized aluminum tubes are **barrel liners** which are inserted in the shotgun barrel to convert the gauge. Tubes are available in various gauges for 12, 20, 28 and 410 gauge shotgun barrels.

Many metal distributors are offering new special services to various classes of customers. An example is a new division of Reynolds Aluminum Supply Co. which is offering western manufacturers of mobile homes, travel trailers, etc., aluminum **side and roof panels** fabricated to the customer's exact blueprint specifications. The new Mobile Home Fabricating Div'n is located at 6446 E. Washington Blvd., Los Angeles. General manager is H. E. Cooper; western sales manager is J. R. Stahr; sales engineer is G. F. Hernandez.

Aluminum is seeing some interesting applications in the sports world. For the hunter **fox and hawk calls** of gold anodized aluminum offer fatal invitations to wild game. The calls are made by Truetone Game Calls, Inc., P. O. 3043, Bellaire 101, Texas. And recent news reports tell of aluminum's roll in the French victory in the downhill ski race at the Winter Olympic Games. The French team used skis with wooden cores sandwiched between two pieces of aluminum alloy.

A plant for producing **specialized metal work** — stampings, weldments, pressed shapes, etc., — has been

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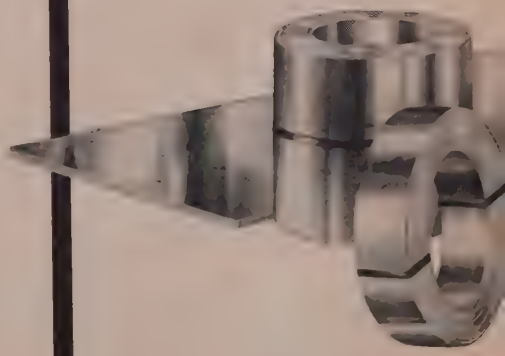

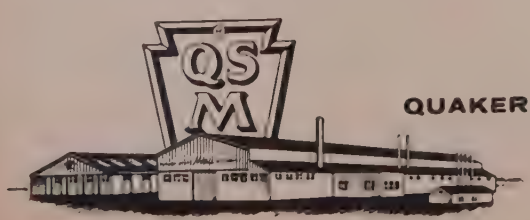

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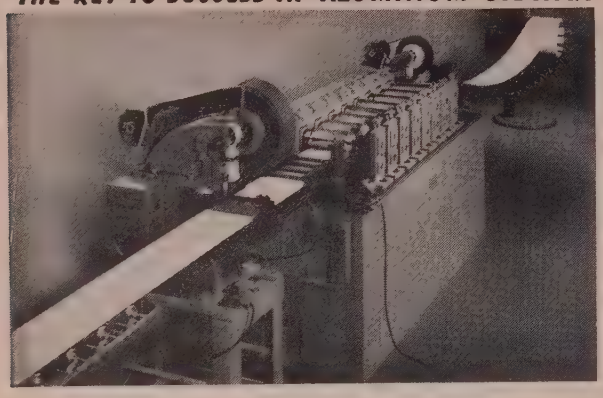

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purchased by the Ellicott Machine Corp. from Charles T. Brandt, Inc. The plant, located at Bush and Ridgely in Baltimore, Md., will be operated by Ellicott-Brandt Inc., a wholly-owned Ellicott subsidiary. This acquisition is part of the expansion and diversification plan of Ellicott. Primary purpose of the new facility will be to fabricate dredge hulls and other components. Other production will include special weldments of aluminum.

A double-barreled **waffle baker** produced by Gloekler-Meynell Corp., P. O. Box 1151, Erie, Pa., has silicone-treated cast aluminum grids said to resist sticking. The unit bakes two waffles at once.

Symmetrical light distribution is advantage of aluminum anodized post-mounted **outdoor lamps.** McPhilben Lighting Inc., 1329 Willoughby Ave., Brooklyn 37, is the manufacturer. The lamps can use incandescent bulbs up to 300 watts or mercury vapor lamps rated through 250 watts.

Food packages formed and sealed at the corners with heat, and a special machine to do this, have been developed by John T. Raisin Corp., 1575 Bayshore Blvd., San Francisco 24. To accomplish heat sealing packages are lined with aluminum foil, polyethylene, or vinyl. The heat-sealed packages are said to be leak-proof and eliminate the use of glues or disfiguring locking devices. The adjustable machine forms the packages from pre-cut blanks. The foil-lined container can be oven-heated to 450°F.

Aluminum shipping containers up to 43 feet long are now being made for submarine periscopes. The containers are designed and manufactured by the Baltimore (Md.) Steel Co. for the U. S. Navy Bureau of Ships. By using 3/16-inch 6061-T6 aluminum sheet, 700 pounds were saved over previously used wooden packages. The reusable aluminum package is tested to withstand a series of 18-inch drop tests, and can hold 9000 pounds when stacked three high, fully loaded.

All activities of the **architectural sales** and manufacturing division of Reynolds Metals Co. have been consolidated in Louisville, Ky. The 28 members of the division's staff—including those in the engineering, estimating, purchasing and marketing departments—have moved to Reynolds Plant 12 in Louisville, where curtain wall products are fabricated.

In an effort to grab a larger chunk of the billion-dollar market for **support equipment for missiles** and military and commercial aircraft, Bendix Corp. has set up a support equipment organization. Complete manufacturing and marketing facilities are located in Teterboro, N. J., and South Bend, Ind. L. V. Bjong will manage the Teterboro center, and W. J. Kunz, Jr., heads up the South Bend section.

Another **anodizing facility** has been built and was slated for a June production start. It is the $750,000 multi-color anodizing and etching plant of Anodyne Inc., 1400 N. E. 165th St., North Miami, Fla. It is part of the large aluminum complex in Dade County (see "Aluminum is Booming. . . ." MM, p. 70, April '60.)

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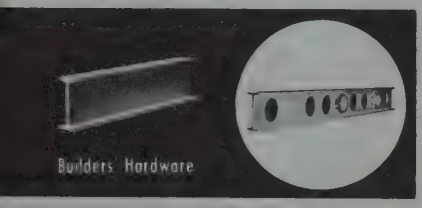

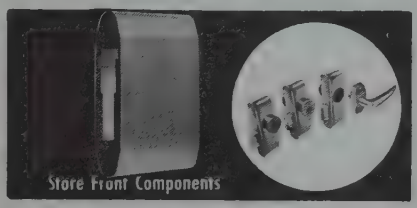

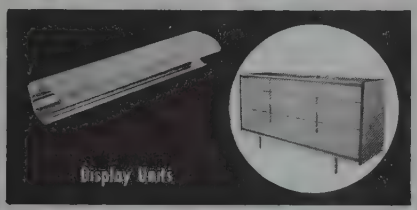

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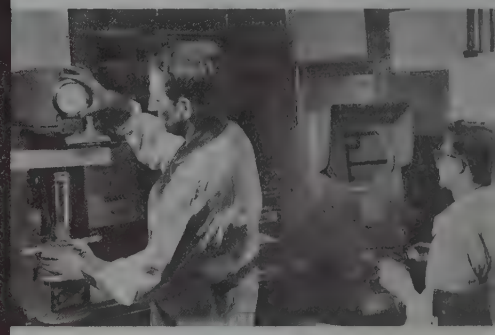
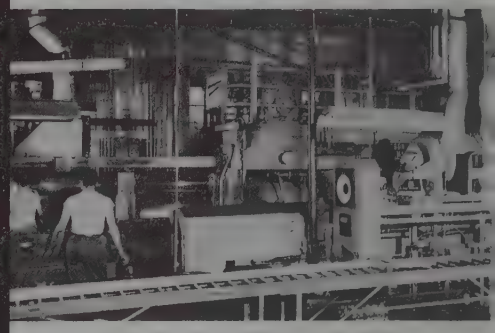
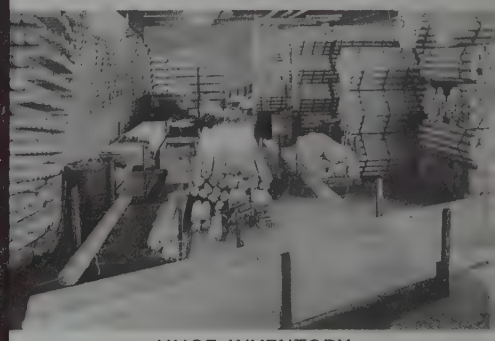


QUALITY CONTROL



MULTIPLE PRESS CAPACITY



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Useful Data

Press equipment for pressure processing is described in bulletin 6000 by the Hydraulic Press Mfg. Co. Covered are metal working presses for forming, drawing, forging, blanking, straightening and embossing. Process presses detailed are for briquetting, blocking, dehydrating, rayon steeping and powder metallurgy. Other equipment includes C-frame presses, dieing machines and die casting machines. For copy write C. P. Terry, The Hydraulic Press Mfg Co., Div'n of Koehring Co., Mt. Gilead, Ohio.

"Screw Fastening of Aluminum" covers various types of standard and special fasteners and fastening systems used to join aluminum assemblies. This Reynolds Metals booklet contains 38 illustrations and 12 tables; also includes a list of manufacturers of special screw fasteners, and recommends hole sizes for various types of self-tapping screws in sheet aluminum and other materials. For copy write Reynolds Metals Co., PRD-32, Richmond 18, Va.

Refractories for all foundry needs are detailed in publication by Harbison-Walker. Specific types and classes of refractories used for cupolas, electric, malleable and nonferrous metal furnaces and pouring equipment are covered. Included are data on refractory molding media, plastic graphite — refractories, high temperature bonding mortars, insulating and castable refractories. To get copy, write R. R. Miller, Harbison-Walker Refractories Co., 307 Fifth Ave., Pittsburgh 22, Pa.

Structural adhesives, design concepts, joint designs and bonding methods are covered in a new 3 M catalog. Technical information, tables and line drawings deal with types and properties of Scotch-Weld film; one-part heat curing and two-part chemically curing adhesives; proper design methods for structural adhesive bonding; typical structural adhesive joint designs; and fabrication methods including surface preparation, adhesive application and bonding equipment. Write on company letterhead to E. F. Hess, Adhesives, Coatings and Sealers Div'n, Minnesota Mining & Mfg Co., 900 Bush Ave., St. Paul 6, Minn.

Magnesium electronic components are discussed in a new Dow booklet. Advantages of magnesium — light weight, superior damping capacity, availability of elevated temperature alloys — are detailed. Also included are illustrations of electronic products using magnesium. For booklet write William H. Gross, Dow Metal Products Co., Midland, Mich.

Quick facts on aluminum coil, sheet, plate, tubing, pipe, rod and bar available from stock of Joseph T. Ryerson are given in a new buyers guide. Also listed are aluminum roofing, siding, thresholds, sills, hand rails and store fronts. Federal specifications, analyses, mechanical properties, tolerances, machinability ratings, finishes, corrosion resistance and relative costs of aluminum are also given in bulletin 30-1. It can be obtained by writing to R. L. Nordstrom, Joseph T. Ryerson & Son Inc., Box 8000-A, Chicago 80, Ill.

Tungsten-inert-gas (TIG) welding catalog by Air Reduction covers complete line of manual, semi-automatic and automatic equipment, tungsten electrodes, and filler wires. Data are included on two manual TIG holders, H10-C pencil-size holder for general use on medium gauge metals, automatic heads for long run production applications, and a

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Saw: 14" std. for 3" cuts; 20" max. for 6" cuts. Stroke: 28 per minute maximum for 6" wide material. Table is cast iron 15" x 48" with aluminum throat plate and opening with chute for automatic removal of pieces up to 6" long.

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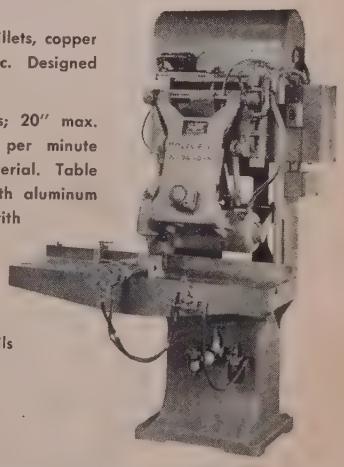

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Jerry Settles

President

"You run the big shapes . . . we'll run the small"

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manual welding outfit for welding light gauge nonferrous and ferrous metals. For copy of ADC 709G, write Stanley Steckler, Air Reduction Sales Co., 150 East 42nd St., New York 17.

Fluorocarbon coatings, silicones, epoxy resins and other coatings, and how they can be applied to solve product and production problems, are discussed in a new 12-page booklet. Properties detailed include chemical and corrosion resistance, wide-range temperature stability and electrical qualities, as well as dry lubrication and anti-stick characteristics. Examples of successful applications are included. For copy contact Eugene Wesoloski, Industrial Coatings Division, National Glaco Chemical Corp., Chicago 39, Ill.

Hollow aluminum bar stock in an extended range of sizes is covered in new booklet by Harvey Aluminum. Tables list standard sizes in round and hexagonal rod and bar, wall thicknesses, dimensions, and weight per foot. Tolerances, mechanical properties and specifications for hollow machining are also given. Copies can be had from Gene Alfred, Harvey Aluminum, 19200 S. Western Ave., Torrance, Calif.

Brazing alloys and techniques for all commercial brazeable metals and their alloys are detailed in a 24-page illustrated manual. Covered are fundamentals such as heat, flame, and torch settings, alloy selection and design. A special section is devoted to aluminum. Write R. H. Mandel, All-State Welding Alloys Co., Inc., 249-55 Ferris Ave., White Plains, N. Y.

High temperature magnesium and high purity aluminum casting alloys are detailed in new bulletin by Bendix Aviation Corp. Composition, mechanical properties, characteristics and typical applications of magnesium casting alloys QE22, HZ32 and ZH62 are given. Similar information is provided for aluminum casting alloys HP355, 356 and 357. To obtain copy, write Ralph Ferguson, Bendix Foundries, Bendix Corp., Teterboro, N. J.

Carbon-dioxide method for making foundry cores and molds is described in new brochure by Liquid Carbonic. Formulas for foundry cores and binders are given, as is list of components needed for Co_2 foundry core gassing kit. Booklet can be obtained from William Price, Liquid Carbonic Div'n, 135 S. LaSalle St., Chicago 3, Ill.

Strubing, a recent development of Wolverine Tube, is the subject of a new pamphlet. Strubing is a seamless light-wall tube processed in strip form, rolled up for compact shipment, and inflated on-site. Brochure outlines economies of packing, shipping and storing, and explains mechanical techniques used to expand strip into tubular form, the alloys which are presently being worked on, method of fabrication, size range, etc. Write John Van Wagner, Wolverine Tube, Div'n of Calumet & Hecla Inc., 17200 Southfield Road, Allen Park, Mich.

Heat treating furnace, in electric or gas-fired models, is covered in bulletin 660 by Hevi-Duty Electric Co. Called Rotair, the unit is designed to meet severe operating conditions and provide accuracy in lower range heat treating. Specific applications are in tempering, drying, annealing, solution heat treating and ageing operations. Booklet gives general description of heating elements, construction, etc. Dimensions of various units are listed and diagrams show how they operate. For copy write Robert Cook, Hevi-Duty Electric Co., Milwaukee 1, Wis.

Recirculating furnace described in Sunbeam Bulletin SEC-8 is said to be equally good for drawing, annealing, tempering and stress relieving both nonferrous and ferrous alloys. It comes in standard gas fired or electric box-type models. Copy can be had by writing R. K. Stephenson, Sunbeam Equipment Corp., 180 Mercer St., Meadville, Pa.

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FIRST SUCCESSFUL PRE-WINDOWS MADE POSSIBLE

General Bronze now producing Alodine-treated, painted Aluminum windows for National Homes

Advanced flash welding techniques give General Bronze products greater weld strength and water-tightness.

An Alwintite picture window frames Alodine 1200S spray-booth equipment at General Bronze Corporation's Alwintite Division, as conveyor-hung windows are Alodized.

Finished windows are loaded into freight car for shipment to National Homes from plant railroad siding. General Bronze supplies all painted aluminum windows for the home manufacturer's "Viking" line.

General Bronze executives examine samples of Alodized aluminum extrusion sections. Left to right: Works Manager, G. M. Keulemans; General Superintendent, George Pruessner; and Purchasing Agent, Harold Heitzmann.

PAINTED ALUMINUM BY AMCHEM ALODINE!

(NOTE: Architects, developers and home manufacturers are calling development of painted aluminum windows "the major improvement that's been made since the inception of that type of window.")

When General Bronze decided to create this new "first"—a baked enamel finish on aluminum windows—for the world's largest home manufacturer, National Homes, it called on Amchem to come up with the proper treatment and coating prior to painting and baking. The answer—a fully conveyorized and automated Alodine 1200S pre-paint spray system. The results, as the General Bronze production team sees them, "the extra security and safeguard of a superior, durable finish, no rejects or paint failure, and not a single customer complaint."

PAST PERFORMANCE PROVED

General Bronze had created an industry standard for excellence when it pioneered the use of Amchem's Aluminum Etchant to produce a special luster-dip effect where aluminum finishes are specified in its line. The constant uniformity and ease of control obtained with this process influenced General Bronze's decision to use the extra safe-guarding qualities of Alodine in creating this major new home building development.

Amchem's special technical advisory service was put into action to help expedite the installation of General Bronze's highly efficient pre-paint finishing system. Amchem engineers collaborated with the equipment builder to provide a virtually custom-designed system. Development Laboratory testing and pilot plant processing continue at Amchem headquarters in the search for even more efficient chemicals for a higher quality and product.

FULL PRODUCTION CYCLE PLANNED

General Bronze plans to use its Alodizing operation 24-hours a day to provide trouble-free operation during peak periods. General Bronze is confident that the Amchem products it uses will enable this company to maintain consistently uniform results in line with its highest standards of design and workmanship. With exciting potentialities in store for painted aluminum windows, General Bronze now considers the possibility of extending Alodine usage to other products—painted aluminum storm windows and sliding doors.

Do you have an aluminum product? A pre-painting problem? Then you have a use for Alodine! Call or write for further details!

Alodized and painted aluminum windows by General Bronze are featured in 1960 National Homes line. Other aluminum portions of National Home models are Alodine-treated for beauty, protection and long life.

Send for Booklet 1424A describing uses of Alodine, the standard pre-paint and protective treatment for aluminum.

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Aluminum Extruders Report . . .

- ***12 would buy up to 50,000 tons of molten metal***
- ***sales in second half look "spotty"***
- ***prices range from 38 to 53 cents a pound; average 44 cents***
- ***13 firms have expansion planned or underway***
- ***customer lists growing; tonnage per customer declining***
- ***producers and independents to blame for price squeeze***

by F. L. Church, Senior Editor

TWELVE independent aluminum extruders are willing to purchase molten metal, and their combined requirements would total nearly 50,000 tons a year.

This and other up-to-date extrusion industry information was reported in answers to a Modern Metals survey questionnaire distributed late last month to independent aluminum extruders. To date, 37 firms have returned the questionnaire. Aside from the interest in molten metal contracts, the replies indicate that:

- The outlook for extrusion sales in the second half of the year is spotty — all the way from "excellent" to "same as '59" to "way off."
- The industry's price dilemma is getting worse.
- Extrusion prices run the gamut from 38 to 53 cents a pound, with the average hovering around 43 to 44 cents.
- Most extruders are increasing their customer lists, but many find their tonnage per customer declining.
- Many extruders have managed to cut costs in the past year.
- Thirteen of them have expansion either underway or planned.
- Most extruders agree that the chaotic pricing situation is the industry's worst problem, but they don't agree as to who is to blame or how to solve it.

A Fair Cross Section

The 37 extruders who returned the questionnaire represent a fair cross section of the industry. A few of them are among the largest of the independents in the business; most are relatively small shops. Several of them rely rather heavily on end products, but most are primarily job shop extruders.

Most of the respondents offered at least some sort of answer to each of the 11 questions in the survey. The replies that hold the greatest potential significance for the aluminum industry as a whole are those indicating an interest in molten metal contracts.

During the 1957-58 aluminum hearings of the Yates Committee, it was suggested that independent fabricators might ease the so-called "price squeeze" problem by setting up a cooperative purchasing venture which could negotiate for a "hot metal" arrangement along the lines of the contracts that Reynolds Metals Co. then had with General Motors and Ford.

Stalled on Hot Metal

But at the most recent hearings (May of this year), the committee was told that the Aluminum Extruders Council had made an effort to initiate negotiations for such a contract (see MM, June '60, p. 43), and had been stalled off to such an extent that further correspondence seemed pointless.

Later in the hearings, spokesmen for both Reynolds (see p. 56) and Alcoa assured the committee that their companies would give serious consideration to a sincere request for a hot metal contract. It was made clear, however, that the company or group requesting such a contract would have to guarantee to take a substantial quantity of metal.

With this in mind, we included a question asking the extruder if he would be willing to join with other extruders in creating a joint purchasing venture, and if so, how much metal per year he could guarantee to buy.

As noted above, 12 independent extruders expressed such an interest, and revealed the amounts they could guarantee to buy. Their total guarantee would come to nearly 50,000 tons per year, which is well in excess of the amount provided for in any known molten metal contract. The *maximum* amounts under these contracts are:

Contract	Tons/year
Alcoa-GM (Warrick)	36,000
Reynolds-GM (Jones Mills)	20,000
Reynolds-GM (Massena)	37,500
Reynolds-Ford (Listerhill)	32,000

The present primary producers may not wish to deal with the independent extruders on a hot metal basis; it has been observed — perhaps with justification — that some extruders would welcome lower metal prices as an opportunity to drop their extrusion prices still lower, and there's no reason to believe that the producers care to see any further demoralization of the market.

It is known, however, that other interests are considering entering the primary aluminum field. Some sort of hot metal deal with a group of reputable extruders — or other non-integrated fabricators — might provide the incentive needed to get one of these newcomers started in the primary aluminum field.

Getting back to the questionnaire results, 16 extruders reported favorably on their business outlook for the last half of this year; eight expect their volume to be about the same as in either the first half of '60 or all of '59; and eight see the last half outlook as anywhere from "poor" to "way off — we are cutting down, except for end products." Five respondents gave no clear answer.

An almost unanimous reply of "worse" greeted the question: "Any sign of prices firming up, or is the situation getting worse?" Asked for the reasons for this dilemma, extruders came up with a wide variety of answers.

'Too Much Capacity'

"Too much capacity for present demand" sums up the opinions of eight extruders. Strangely enough, only seven respondents pointed the finger of blame directly at the primary producers, while five found the independent extruders themselves primarily at fault.

"Majority of independents have no idea as to cost of extruding, finishing, or shipping," declared an extruder in the Youngstown area. "A few hungry extruders are going to rock-bottom prices in order to cover their overhead," complained another.

A bright outlook was reported by a few firms. A spokesman for Quality Aluminum Products Co., Coldwater, Mich., not only forecast a "very good" outlook for the second half, but also saw prices as firming up "due to enter-

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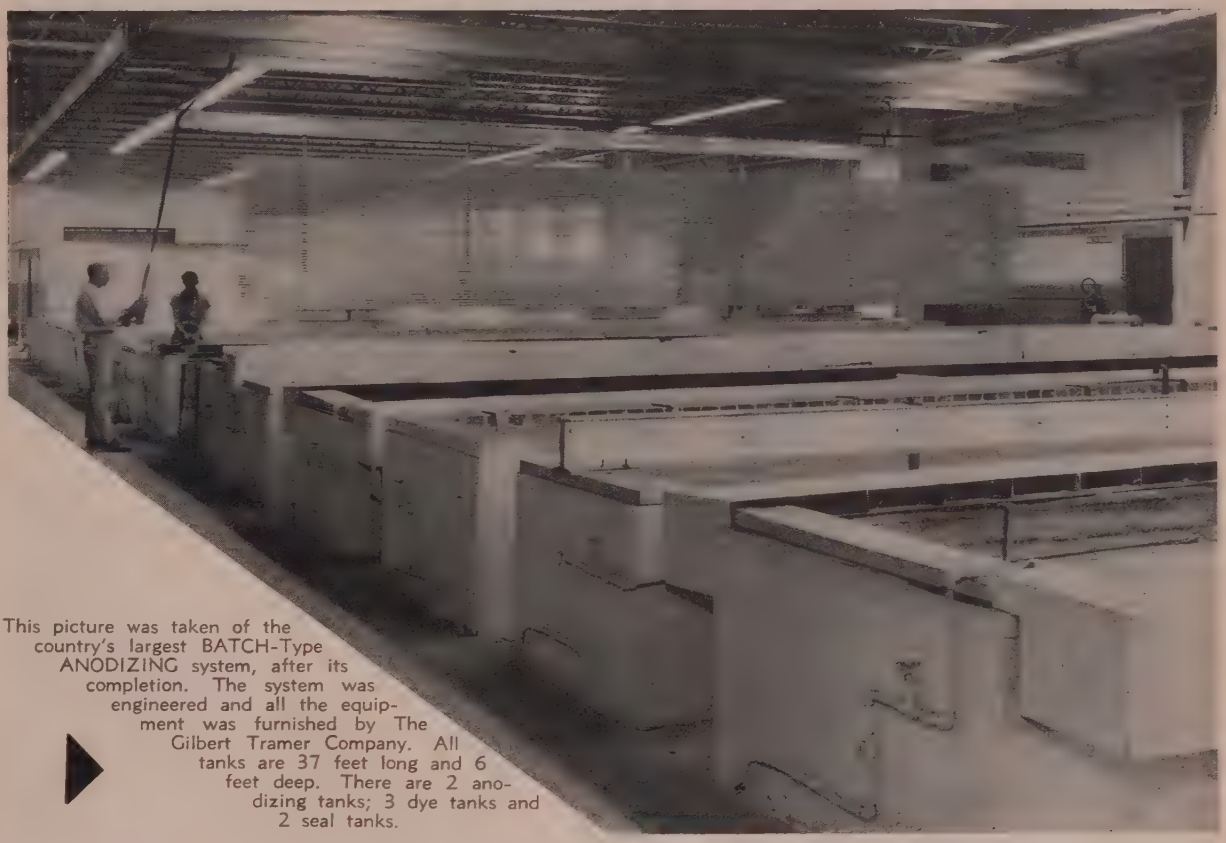

This picture was taken of the country's largest BATCH-Type ANODIZING system, after its completion. The system was engineered and all the equipment was furnished by The Gilbert Tramer Company. All tanks are 37 feet long and 6 feet deep. There are 2 anodizing tanks; 3 dye tanks and 2 seal tanks.

Installation was made at the Weather-Tite Company in Bedford, Ohio.

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ing the busy season — there is no time to talk price; customers need metal."

As noted earlier, the average prices quoted by our respondents ranged from 38 to 53 cents a pound. Ten replies were in the 38 to 40 range; 12 were in the 41 to 44 cent category; and 10 quoted prices averaging from 44 to 53 cents a pound. The median was 44 cents. Five respondents didn't answer.

The customer lists of 21 of our respondents are growing, while six others reported a decline in number of customers. Ten extruders either failed to answer the question or reported no change in number of customers. As for tonnage per customer, 12 extruders reported increases ranging from 3 to 30%, while eight reported declines of from 10 to 60%. The rest didn't answer.

A potentially favorable trend in the extrusion industry was revealed by answers to the question: "Have you cut costs in the past year?" Fully 26 of the replies said "yes" and only seven said "no." The rest didn't answer.

Most of the cost cutting came as the result of new and more efficient equipment, while a few attributed their lower costs to "improved billet" or "better die design" or "new cost system" or "tighter quality control."

Of the 13 extruders who reported expansion either underway or planned, five said that they were installing new presses, and five were increasing their finishing facilities — new anodizing equipment, for the most part.

Only six of the respondents failed to answer the question: "What's the extrusion industry's worst problem today?" Of the 31 who did reply, 21 saw the main problem as either price cutting or "price squeeze." A few were more specific.

'Publicize the Offenders'

"Senseless pricing or quality gimmick on part of one or two extruders drives entire extrusion industry to new tougher standards and smaller or non-existent profit margin," complained one extruder. His solution to the problem: "Let the Aluminum Extruders Council closely examine the activities of all and honestly publicize the offenders, major and independent alike."

An extruder in Kentucky claimed that the prime producers "are selling extrusions at a loss of at least 6 cents a pound." As a remedy, he proposed that the independent extruders and smelters "form a corporation to produce primary aluminum."

A Youngstown extruder saw "Integrity" as the big problem, and urged "better and more honest communications between competitors" and "a price schedule that all will honor."

Another reply cited several problems —"Small orders; refunding customer die service charges; slow collections; requests for lighter sections." To solve these problems he suggested: "Have customers guarantee larger orders and carry stock in plant. Stop refunding die charges. Force payment — 30 days." He also believes that extrusion salesmen should "stop finding ways to sell by not using the price book."

'Prices Firm 'til Winter'

He thinks prices will stay firm until winter "because the fabricator has no time to think about prices and can't change to another extruder now because of tooling. When business falls in the winter and customers begin to change designs for new products, they will shop for price."

Commodity pricing by the primary producers is the big problem, according to an extruder in New England. "Depressing a market price by commodity pricing to discourage customers from becoming extruders doesn't enlarge the market," he asserted. "It simply cuts the profit margin."

An extruder in Ohio had several complaints including "Extended credit, low prices, thin walls, exceptional tolerances, lack of customer planning." His cure: "Cut off extended credit; firm up prices; eliminate panic in off season." He also felt that "an effective industry-wide organization with membership responsibility would be a big help."

The production vice president of a firm in the Deep South cited light sections and tight tolerances as the worst problems, but his remedy seemed somewhat incongruous: "Add secondary operations and try to get paid for it."

Of those extruders who considered price cutting as a most severe problem, some proposed remedial action such as: "Learn to live on less than 100% of capacity"; or "instruct a number of extruders in the fundamentals of economics"; or "tighten credit"; or "find new markets to increase demand."

A sizeable extruder in New Jersey advised his colleagues to "Educate your own salesmen as to costs of dies, small order runs and the economics of the business so that they will get this across to customers, who are dictating prices."

Four independent extruders branded "over-capacity" as the main troublemaker (one of them also revealed that he is expanding his own capacity), and offered a number of cures.

An official of North American Extrusions Corp., Kalamazoo, Mich., suggested "vigorous research and engineering help for potential customers of extrusions — assist them in finding good applications for extrusions."

He acknowledged, however, that "this requires a larger profit margin," and noted that some extruders, particularly newer ones, "seem to be content with the small margin they can get by offering lower prices to customers of other extruders."

An extruder in the South offered a more severe remedy for the over-capacity problem. "By merger, bankruptcy or liquidation, reduce the number of extruders so that a smaller group is left which can police itself," he declared. He also pointed out that the "extreme reduction of the spread between raw material cost and selling price" means that the independent "must have a high percentage of his press capacity in his own end products to lift his profit."

A New Englander couldn't offer a solution to the capacity problem but he did observe that "the worst aspect is that we must purchase from the primes and then compete with them. They never raise their extrusion prices, but they do raise pig and billet."

Complaints against the primary producers were not as numerous as we had expected. One extruder in Ohio could not understand "why the primes sell extrusion ingot to non-extrusion customers on extended credit so that they, in turn, can work out conversion deals with extruders." That's a new one to us.

Another man griped about "billet prices remaining the same while extrusion prices are going down." A third was disturbed by competition from the primary producers "who can subsidize their extrusion divisions with pig profits." A California extruder who considered competition from the producers as the industry's most serious problem, proposed that independents "discontinue purchase of pig and billet from the primes."

'Give Service, Quality'

A few of the respondents were more critical of their fellow independents.

"The independent extruder should stay in his own backyard," advised the president of a firm in Missouri. "He should give service and quality rather than quantity at a low price; should be able to purchase extrusion billets with same flexibility as the selling price of extrusions.

"Until the independent extruders get their own house in order, this 'rat race' will continue," he added. "Whether they get a hot metal contract or not, we will continue to have cut-throat competition. Extruders must organize and respect the problems of each other. Otherwise, one large independent can upset the whole market.

"We should be able to sell extrusions on a firm price basis equivalent to the inflexibility of the price of primary billets," he concluded.

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FOR CONTROLLED CASTING OF NON-FERROUS BILLETS

The direct chill method of casting has practically eliminated all of the objectionable defects that are present in most static castings. Because of the controls available to vary the casting conditions, billets cast by this method are particularly sound and free from segregation, porosity, and inclusions. Grain size and structure can be controlled or varied for different applications.

Direct chill casting is accomplished by pouring molten metal into an open end, water cooled mold that is closed at the bottom by a movable block. As the metal solidifies sufficiently to form a skin, the bottom block is lowered at a controlled rate and the direct chill casting is in process. A wide variety of shapes and forms is possible to cast in bar lengths replacing individual castings, resulting in considerable savings in machining and fewer rejects because of casting flaws.

Permanent Mold Die Company is a pioneer in the direct chill casting process. Through the research facilities of PMD, better casting methods are constantly being devised . . . methods that insure higher quality castings at lower costs. And remember, a Permanent Mold Die Co. engineer is available to anyone having die casting or tooling problems.

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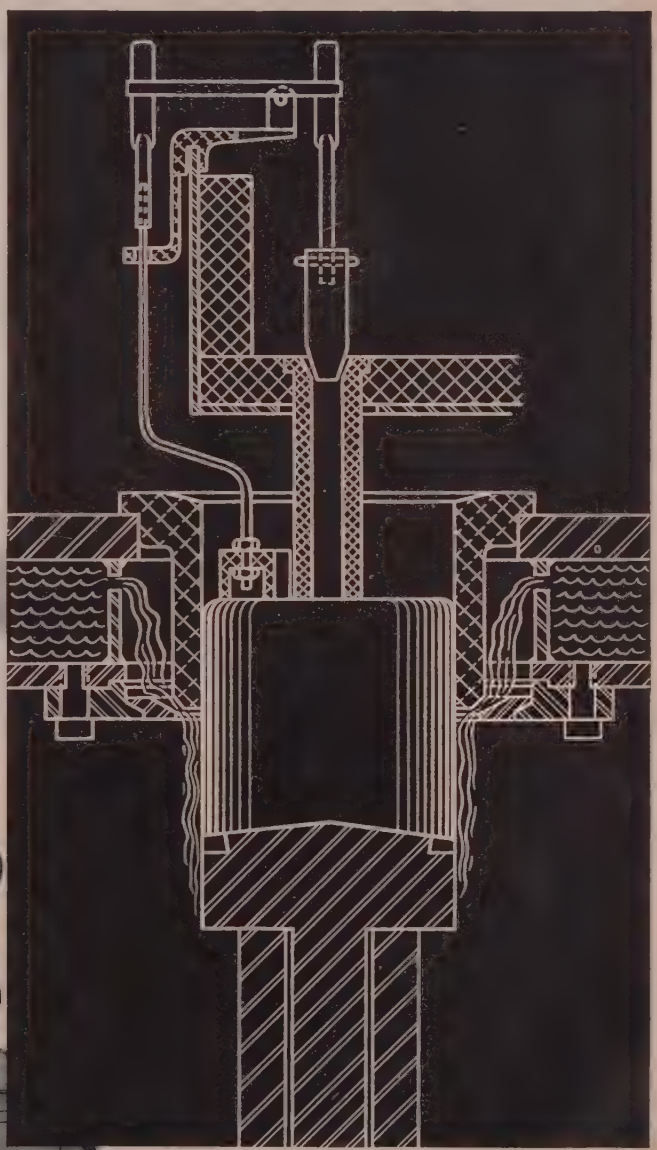

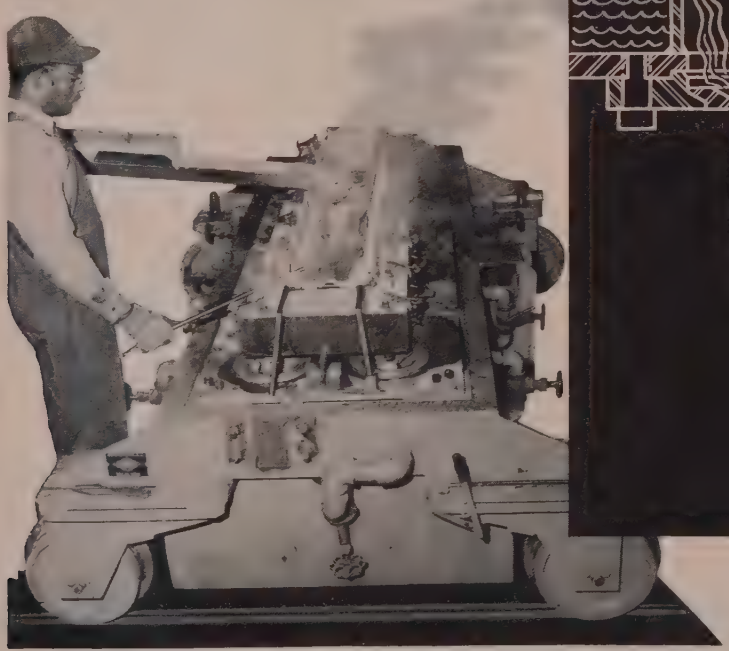

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Frameless Design Simplifies Aluminum School Bus Shelter

SOME ten thousand distinctively designed aluminum shelters will be in use at school bus pick-up points in many rural and suburban areas in the U.S. this fall.

The red painted shelters, styled after the one-room schoolhouse of a bygone era, were originated by Roadside School House, Inc., Dallas, Texas, to protect youngsters from inclement weather and contribute to their safety by alerting passing motorists to the proximity of school bus stops.

The Veterans of Foreign Wars found the idea so appealing that its National Council of Administration is urging 8500 VFW posts throughout the nation to provide the shelters at schoolbus stops as a community service. The VFW has signed an initial contract for the first 10,000 aluminum structures.

Early models of the shelter were made of wood, but the originators wanted a material that was more durable and more "glamorous," that required less maintenance, and could be shipped economically from the fabricator's plant to distant sites. They chose aluminum, and called on the Metals Division of Olin Mathieson Chemical Corp. for help in designing and engineering a sturdy shelter for mass production.

Marvin Brooks, Olin Mathieson's architectural representative in Dallas, developed the design in aluminum panels that could be roll-formed from embossed, pre-enameled coil stock. His design departs sharply from the conventional sheet-on-frame construction.

No Framework Needed

Adapting stressed-skin principles used in the aircraft industry, he came up with a modified monocoque construction in which roll-formed, interlocking ribbed aluminum panels support the shelter without structural frames.

Olin Mathieson then introduced Roadside School House, Inc., to Temco Aircraft Corp., manufacturer of jet planes, missiles and weapons systems. The latter's Temco Industrial Division was on the lookout for ways to diversify its operations, liked the shelter idea, promptly built some prototypes.

Two of these were put on display in Washington, D.C., during the recent White House Conference on Children and Youth. They attracted much favorable comment from the delegates.

The basic structural element of the shelters is just one shape of ribbed panel, with very few modifications to take care of returns and corners. A number of small aluminum extrusions serve primarily as binders or transition members to provide continuity between the roll-formed panels.

Sharp edges that might cut a child's hands or catch his clothes are eliminated. The enameled aluminum sheet is embossed to minimize reflection and local denting and to provide a textured surface that discourages schoolboys' attempts to scratch initials on the walls. The only wood in the shelter is the 1 x 10-inch plank seats, for easy replacement and a warmer surface.

The steeply sloped roofs are designed to permit the rapid attachment or removal of flat sheet aluminum advertising sign panels, each measuring 5 by 9½ feet. Theme of the advertising would be subject to approval by the VFW unit owning the structures.

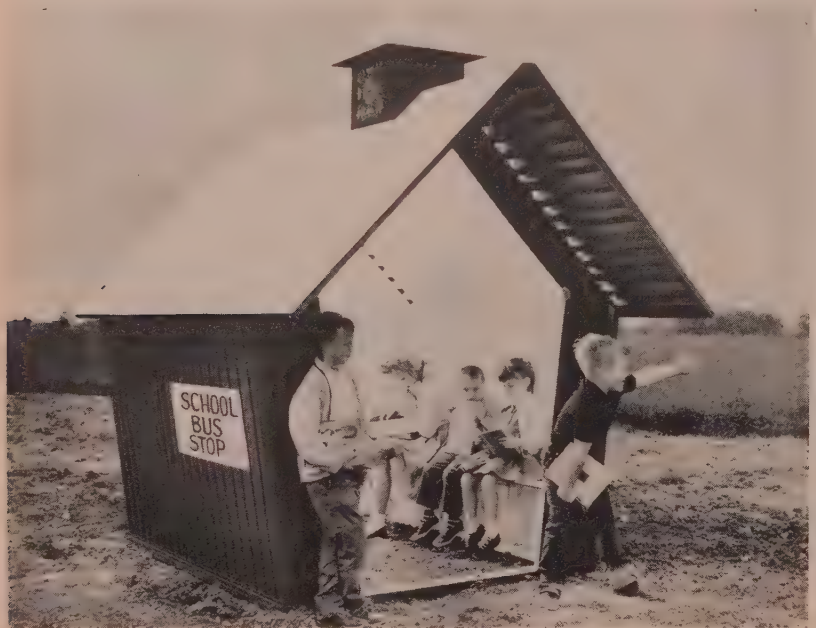
Shelters Shipped in K-D Form

The shop-assembled panels—two sides, two end units and two roof panels, plus seats and other components for one shelter—will be pre-packaged at the Temco plant in Dallas and shipped in knocked-down form. The shelters can be erected quickly, with ordinary tools, at the school bus stops. Completed, they weigh about 200 pounds—150 pounds of embossed, baked-enamel building sheet and 50 pounds of special extruded shapes of alloy 6063.

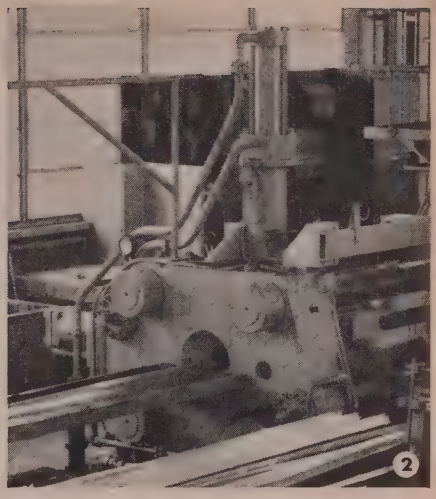
Commander-in-Chief Louis G. Feldmann of the VFW says the shelter project is ideally suited to the traditional community service objectives of the organization, and has the further advantage of fulfilling an almost nationwide need for school bus-stop shelters, especially in rural areas.

He explained that VFW units on the department, district, county or local levels would be able to buy the shelters through a sponsorship arrangement between the national organization and Roadside School House, Inc. Participation is on a voluntary basis as far as individual VFW posts are concerned.

However, in communities where VFW posts reject the opportunity to sponsor placement of the aluminum shelters, the manufacturer will exercise the privilege of inviting the sponsorship of other organizations active in the community service fields.

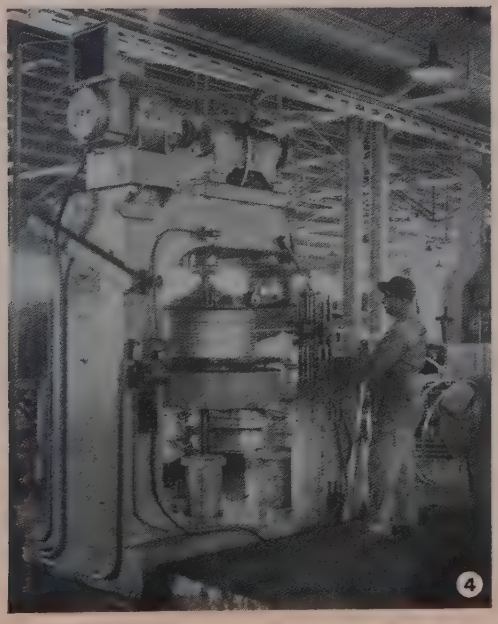


■ ***Resembling yesteryear's "little red schoolhouse," aluminum shelter uses 150 pounds of sheet, 50 pounds of extrusions. First order calls for 10,000 units.***



YOUR BENEFITS

from buying Wolverine aluminum tube



COMPLETE TUBULAR PRODUCT LINE—Wolverine Tube, Division of Calumet & Hecla, Inc., manufactures aluminum tube in a wide range of sizes and alloys in straight lengths and coils. It is available in both drawn and extruded form, in prime surface or with integral fins (Wolverine Trufin®).

FACILITIES—Wolverine's aluminum production facilities are among the most complete available and include such operations as those pictured on this page: (1) casting; (2) extruding; (3) standard coiling and fabrication; (4) level-wind coiling—to name but a few.

TUBING SPECIALISTS—Equipment is only as good as the men who operate it. Wolverine employees take pride in their Tubemanship—have an average length of service of 11 years. More than 150 employees are active members of Wolverine's Twenty-Five-Year Club

SERVICES—Wolverine believes that the customer is all important—expresses this philosophy through its IOA (Individual Order Attention) program which begins with the receipt of an order, follows it throughout the entire manufacturing process, and ends only when that order is in the customer's plant and acceptable in every way.

TECHNICAL ASSISTANCE—Wolverine Tube uses its years of experience, its skilled engineering, and its research and laboratory facilities to help customers specify exactly the tubing type and alloy best suited to their needs.

MAY WE HAVE YOUR NEXT ORDER?

WOLVERINE TUBE
DIVISION OF
Calumet & Hecla, Inc.
DEPT. C, 17262 SOUTHFIELD RD., ALLEN PARK, MICH.

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA
SALES OFFICES IN PRINCIPAL CITIES

J-8893

Distributors Forecast

4% Gain in Aluminum Sales in '60

Fourth quarter sales surge expected to make up for slight January-April decline, but will not be strong enough to prevent sales of all metals from dropping 2% under 1959.

A FOURTH quarter surge will help the nation's metal distributors sell 4% more aluminum this year than last, but won't be strong enough to avert a 2% drop in overall sales, including those of other metals and, in some cases, metalworking equipment.

This prediction was made by the board of directors of the National Association of Aluminum Distributors at a recent meeting in Chicago. The group sees better business ahead in spite of a 2% aluminum sales drop in the first four months of the year, as compared to a similar 1959 period. Total dollar volume remained the same.

The prediction for the rest of the year and the 2% decline are based on sales statistics reported by the distributors represented on the NAAD board. The board feels it represents every major industrial area in the country; that its figures give a good indication of the state of the entire aluminum distributing industry.

Sold to 176,000 Customers

Last year, the 17 firms represented on the board sold $534 million in goods and services to 176,000 customers.

Other figures prepared from the group's company statistics showed that total volume is about the same this year as last, though sales of all lines fell 13% in April, while aluminum sales dipped 7%. Conversely, total inventories were up 17%, while aluminum stocks rose 11%. Average collection period at the close of April was 35 days, a two day increase over March.

Total sales for the year are expected to be 2% below the '59 level. This means the group is counting heavily on aluminum from here on in to keep total dollar volume close to that of last year. The light metal must not only make up its own 2% decline, and do well enough to reach its expected 4% increase, but must also take up some of the slack obviously expected for other metals.

At a special press conference held after the board meeting, members from various sectors of the country discussed local business conditions.

North Atlantic Region (all of New England, eastern N. Y., eastern Pa., Md., Del., Va.), reported by L. E. Brion, Jr., Peter A. Frasse & Co., Inc., New York City.

"Aluminum is still a growth product, and we expect aluminum business to increase 5 to 10% over 1959. This will result from finding new markets and from more aggressive selling."

Though generally optimistic, Brion reported a drop in sales of 3003 and 5052 sheet. This, he said, was the result of commodity pricing. Brion also said that the market for circles in this area was almost completely lost to imports.

Southern Region (S. C., N. C., Ga., Fla., Tenn., La., Ark., Texas), reported by C. S. Vogel, Edgcomb Steel Co., Philadelphia.

Vogel noted that considerable expansion in manufacturing has taken place in the South since the end of World War II, and that service centers have been established at a rate comparable to this rate of growth. "I hesitate to paint too glowing a picture of the South," he said, "but we do expect volume this year and next to be equally as high as during the past few years."

Great Lakes Region (Chicago, Milwaukee, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Louisville), reported by R. J. Meier, Meier Brass & Aluminum Co., Hazel Park, Mich.

Meier was "greatly concerned over false information on the economic climate of Detroit and other parts of Michigan. Things aren't as bad as some have said," he declared, though he admitted that much of the Michigan economy depended on the auto industry, which isn't up to expectations.

Meier also discussed a problem affecting the distributing industry in general. When the primary producers come out with a new alloy, old ones remain in existence, he explained. Result: Warehousers now have to stock several overlapping materials. These include alloys 1100, 3003 and 5005, and building sheet, all of which represent about 60% of tonnage sold. Meier said this complicates stocking and raises costs.

Meier closed by saying he was "looking forward to business holding its own, or increasing somewhat in 1960."

Central Plains Region (Kan., Okla., Mo., Colo., N.M., Wyo.), reported by Marvin Marsh, Marsh Steel & Aluminum Co., Kansas City, Mo.

According to Marsh, the outlook "is not very bright." Aluminum business in his area dropped 15 to 20% in the first half, but he is looking for a better second half and hopes for "only a 5% *decrease* for 1960."

Marsh blamed several factors for this dismal picture. The severe winter shut down almost all construction for 90 days. And then an A. F. L. strike of all building trades was called April 1. As a result, no work was done on old projects, no new ones were started, and business in general dropped.

In addition to these deterrents, the aircraft business — specifically in Wichita and Tulsa — slowed down, while costs of packaging, labor and delivery went up. Marsh concluded by saying that collections had been slow, too.

Pacific-Rocky Mountain Region (Wash., Ore., Calif.), reported by Wayne Rising, Ducommun Metals & Supply Co., Los Angeles.

Rising expects a strong second half and feels that others in his area agree, since they are spending freely to expand their processing departments. "Inventories are depleting and customers are about ready to re-stock," he added. Business has suffered since the government cut back manned aircraft requirements, "but is due to pick up because sales activities have been diverted to commercial plane construction."

A Trend Cited

An important trend — the expansion of processing facilities — was cited in Wayne Rising's report, and expanded later by Carl Vogel. He said the addition of such equipment will hypo distributor business because it will enable the distributor to prepare large cut-to-size orders more economically than mills.

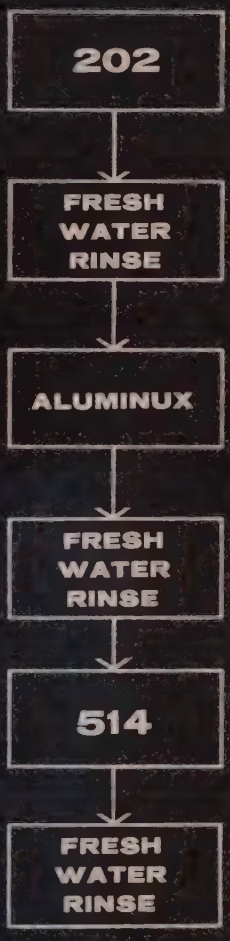
Business looks promising for the aluminum distributor with all areas expecting a good second half. The NAAD looks for a 4% increase in aluminum sales for the year. Though it would not be as high as expected a few months ago by those who were looking to 1960 while standing amidst the swirl of last year's fourth quarter sales, it would still be a step forward.

For faster, more effective and economical

PRE-CLEANING, ETCHING and DE-OXIDIZING of ALUMINUM ALLOYS

rely on this production-proven DIVERSEY METHOD

TYPICAL ETCHING LINE FOR ALUMINUM ALLOYS



DIVERSEY NO. 202 is a "light etching" alkaline soak tank cleaner. It is ideal for use prior to alkaline etching because it not only removes oils and greases but also "activates" the metal surface thereby providing a faster and more uniform etch in the caustic tank.

Good rinsing prolongs the life of the subsequent etching solution as well as insures complete removal of oily contaminants.

DIVERSEY ALUMINUX is the original non-sludging, non-scaling alkaline etchant for aluminum. It provides a finer, more uniform diffused etch. A positive means of solution control assures consistency from load to load and charge to charge.

Good rinsing prolongs the life of the subsequent desmutting solution as well as diminishes the possibility of caustic staining of the work.

DIVERSEY NO. 514 insures rapid and complete removal of all types of smut with the exception of those with high silicon content. It is used at room temperature and emits no noxious fumes.

For assistance in establishing the exact procedures to meet your production requirements consult your D-Man, or write the Diversey Corporation, 1820 W. Roscoe Street, Chicago 13, Illinois

DIVERSEY® ALUMINUX

How Chevrolet Casts Aluminum For the Corvair Engine

Molten metal, hauled from neighboring Reynolds smelter, is used in 13 parts produced at foundry near Massena, N. Y. Unique permanent mold process is used in addition to conventional permanent mold and die casting. Parts for nearly 142,000 engines had been cast up to June 21.

WHETHER by accident or design, the public's introduction last month to the Chevrolet Motor Division's new aluminum foundry at Massena, N. Y. coincided with the third anniversary of ground breaking ceremonies for the St. Lawrence reduction plant of Reynolds Metals Co.

Those fortunate enough to visit the works saw two modern facilities designed for the most efficient production of aluminum and parts for Corvair, General Motors' cocky little entry in the compact class.

Chevrolet is going all out in its efforts to bring Corvair sales to 18% of total Chevrolet passenger car sales this model year. Needless to say, the Massena foundry, only source for cast aluminum components for the rear-mounted six-cylinder engine, is a key operation. Thirteen of the 14 castings produced here are for the little car.

Corvair's engine is unique in concept and depends on at least two unique processes for its production. In a way, production starts at the Reynolds reduction plant where molten aluminum is tapped from the potlines and trucked to the foundry in large ladles. This is a "24-hour-a-day, 365-days-in-the-year" operation.

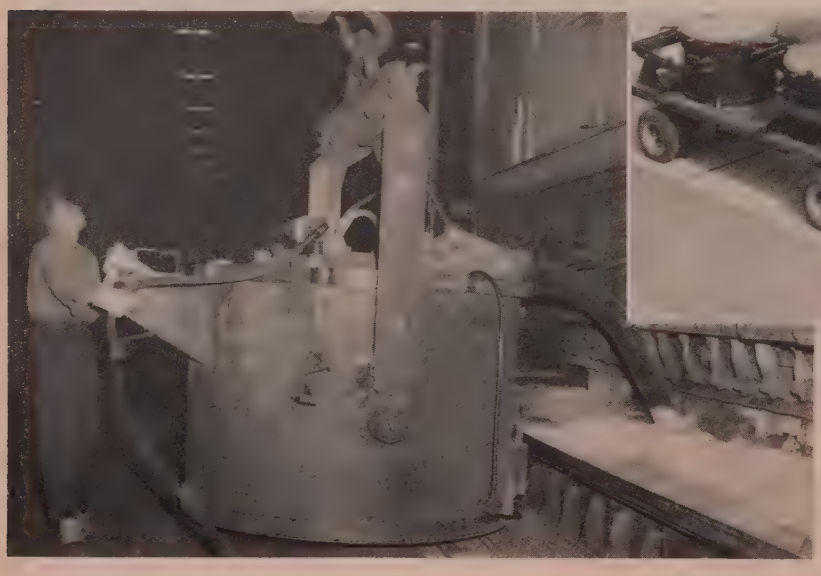
Theoretically, the metal never has to be pigged, but rather is held in large furnaces for distribution to the various casting stations. In practice, however, the foundry has had to solidify up to 1,000,000 pounds of the metal during about a year of operations. The fact that this accumulation is being reduced steadily, even while molten metal deliveries continue, indicates that Corvair sales are good, if not spectacular.

Three types of metal molding performed at the foundry include die casting, permanent mold casting, and low pressure permanent mold casting. The last process is entirely new to the American automotive industry.

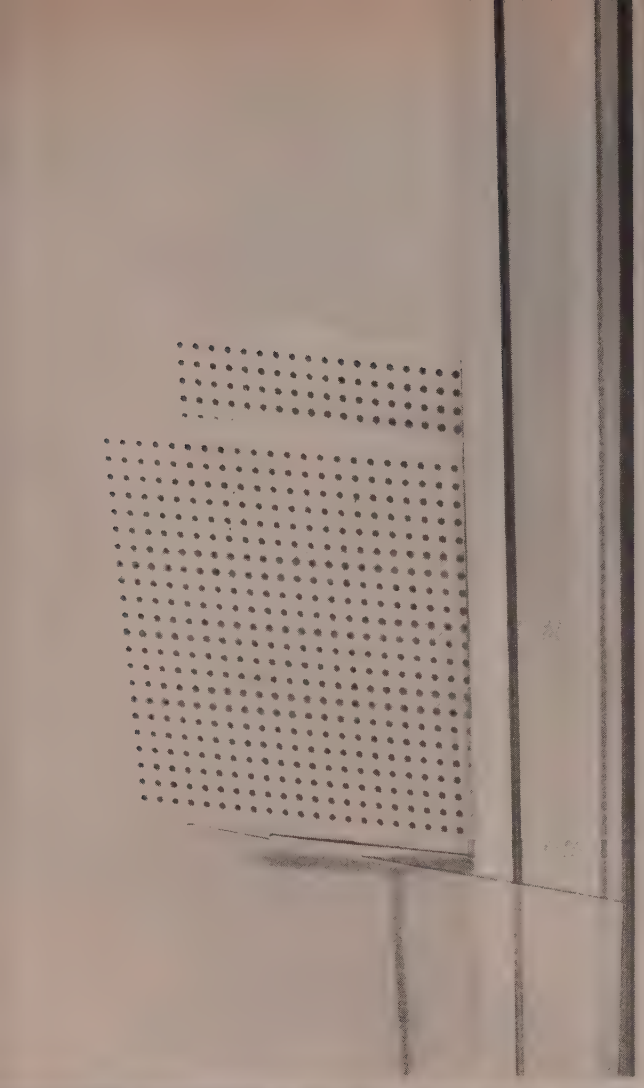
Since the pressure applied in this process is much lower than that used in die casting, it is viewed as an intermediate between die casting and permanent mold. In low pressure casting, air pressures up to 10 psi force the aluminum up through a tube and into the mold cavity which is mounted above the holding furnace. The low pressure, just enough to overcome the pull of gravity, causes a smooth upward flow of the metal without turbulence.

The air pressure assists in this feeding of molten metal until the casting has solidified. The slow flow creates a natural temperature gradient in the mold cavity and promotes directional solidification from the top down.

After solidification, air pressure is released, the mold opened, and the casting lifted and ejected. Result is a casting of high density, free from poros-



■ *Man at left is drawing molten aluminum from a reduction pot into a vacuum crucible at Reynolds Metals' big St. Lawrence reduction plant at Massena, N. Y. Metal will be transferred to Sunbeam holding furnaces for eventual pigging or delivery to nearby Chevrolet foundry. Note delivery method above.*



something new in aluminum

for the building industry

If you manufacture building components—curtain walls, sun shades, windows, sliding doors, structural parts, or other architectural products—Harvey Aluminum can bring you up to date on the newest advances in aluminum. As a major supplier to the building industry: **1.** We produce any size primary mill products, from the smallest glazing part to the largest structural application. **2.** We specialize in custom-designed components, yet we deliver standard shapes for any architectural application. **3.** We assist architects and engineers in creating custom designs and basic structures of aluminum, for original building concepts. **4.** Your aluminum building sections are processed with the same production and quality control procedures we use for critical missile, aircraft and electronic components. **5.** And, as an integrated producer of primary aluminum, we offer sound technical assistance on any building problem. Call the nearest Harvey Aluminum office. Find out what's new in aluminum. Find out how you get all the extras in aluminum from Harvey Aluminum.

HARVEY
Aluminum

A major independent producer of quality aluminum in all alloys and sizes: Pig, ingot, billet, rod and bar, pipe, tube, hollow sections, press forgings, forging stock, hand forgings, impact extrusions, electrical bus bar, structurals, special shapes, light and heavy press extrusions, screw machine and other aluminum products. Similar products in titanium, zirconium, and steel.

HARVEY ALUMINUM SALES, INC.
Torrance, California

■ *Extrusion billet, a sizeable product at Reynolds' St. Lawrence plant, is homogenized in this 30,000-pound Swindell-Dressler furnace.*

ity and shrinkage. There are no gates or risers.

The Division reports that high productivity results from the automatic fill plus the fact that hydraulically actuated molds permit one man to operate more than one machine. Equipment costs are lower than die casting and about equal to equipment for permanent mold.

The unique process originated in Britain but was refined by Carl Schmidt in Germany.

Scrap yield in this operation is minimal; for all operations at the plant, about 4%. Large capacity remelting furnaces made by AjaxMagnethermic Corp., Youngstown, Ohio, handle all scrap, plus any pig remelting needed.

Low pressure casting operations at Massena are devoted to production of cylinder head and crankcase halves, rear engine housing, oil filter and generator adapter, and camshaft gear for the Corvair and the Corvette clutch housing. Thirty-six machines do this.

Following a tour of European plants that used the low pressure casting process, Chevrolet manufacturing executives got together with GM's Process Development Section and worked out low pressure equipment designed specifically for Chevrolet-Massena.

Volume requirements at the new plant dictated several changes in operating methods. For instance, a typical European plant employs one highly skilled operator per machine in what is practically a manual operation. Normally, each machine has its own mold in European practice; there is no interchangeability of molds. This is because lower wage rates in Europe make labor costs less of a consideration.

Economical low pressure casting production at Chevrolet-Massena dictates a three-shift operation with complete interchangeability of parts, using machines that are of more rugged design than European types. Results are high production with minimum down time for mold maintenance and repair. They also get by with less-skilled operators — and fewer of them — because the machines are more automatic than their European counterparts.

Die cast parts include flywheel housings, crankcase covers, idler brackets, oil cooler adapters, and stators for automatic transmission. Permanent mold casting operations are confined to pistons and camshaft gears using equipment supplied by Permanent Mold Die Co., Hazel Park, Mich.

The cylinder head casting produced for the Corvair engine by the low pressure method is said to be one of the most intricate aluminum castings made in America today. The part has deep fins and complex coring. Trim presses can go only so far with this part; clean-up is completed by a trim line composed of six men equipped with power hand or air impact tools.

Each man is responsible for a certain part of the casting. The Division puts up with this anachronism, confident that they've explored every avenue for its complete elimination. It should be pointed out that there were once 12 men on this line.

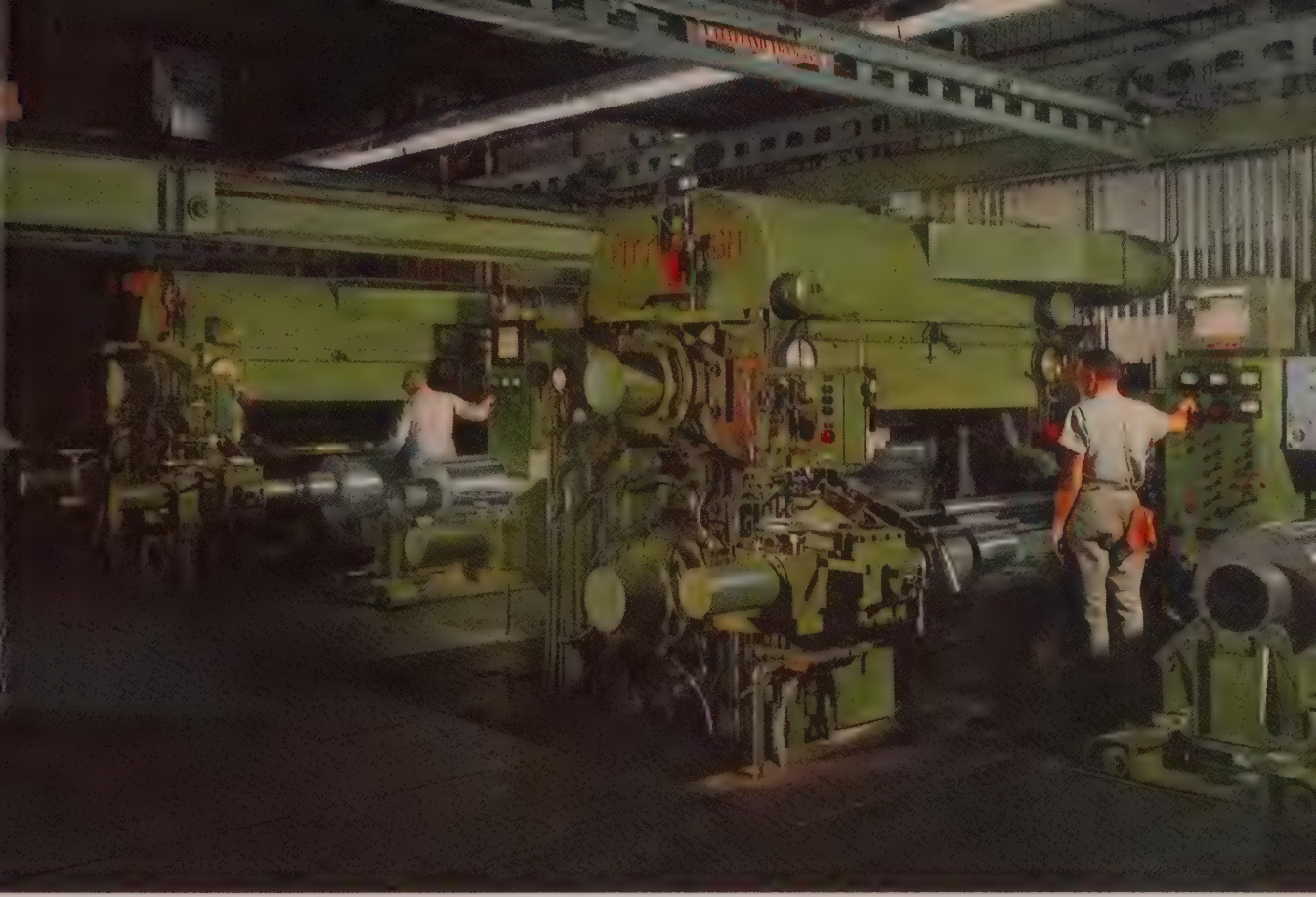
Final processing of all parts except the pistons is artificial ageing at 450°F for four hours. Pistons are heat treated in another process.

Since start of volume production last June, Chevrolet-Massena has produced more than 3,600,000 castings containing more than 24,800,000 pounds of metal.

Reynolds' St. Lawrence reduction plant has three potlines composed of 504 electrolytic cells (total rated capacity, 100,000 tons). Two lines are in production; the third could be started up in a matter of days. Reynolds sells molten metal to Chevrolet-Massena at 10% below the published price of pig. Chevrolet has agreed to buy one-third

(*Continued on page 43*)

■ *They've taken one of the 9000-pound transfer ladles off the trailer at Chevrolet-Massena (left) and are pouring molten aluminum into a 30,000-pound Lindberg induction holding furnace. Fourteen of these are on the job at the foundry. Hydraulic mechanisms cause these furnaces to lift and tilt for pouring into small 2000-pound ladles for distribution to various casting stations. At right, is cylinder head trim line. No machine can do a complete trimming job on this part.*



Precision Foil Mills in Action

at THE ANACONDA® ALUMINUM CO.

High quality aluminum foil as fine as .0002″ in thickness is now being rolled at speeds up to 2,000 feet per minute on these new 64-inch, four-high foil mills at Anaconda Aluminum, Louisville, Ky. Heavy demand for this material requires round-the-clock operation with minimum down time for maintenance.

Design features include a hydraulically operated roll stand to control pressure; a direct drive to permit variable work roll diameters ideal for research in producing metal foil; and X-ray equipment for automatic gauge control.

Contact PITTSBURGH for all your requirements in rolling mill equipment.

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ENGINEERING & MACHINE DIVISION

Pittsburgh Steel Foundry Co., Textron Inc.

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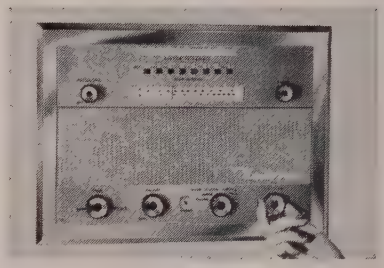
KAISER ALUMINUM

ALUMINEWS

New Products...New Markets...With Kaiser Aluminum!

Nutone Stereo Amplifier Control Panels Of Kaiser Aluminum Offer Consistent High Brilliancy



Nutone, Inc., of Cincinnati, Ohio, gained important competitive advantages for their built-in stereo hi-fi systems by selecting Kaiser Aluminum high brilliancy sheet for all control panels. Kaiser Aluminum cost Nutone only one-third as much as chrome-plated steel, yet offers a lustrous finish with a *color* bonus—handsome gold anodizing. This finish is derived from Kaiser Aluminum alloy 5457 that gives consistent high brilliancy.

Nutone stereo amplifiers, and other hi-fi components, offer the latest luxury in stereo listening. The Nutone amplifier is actually two amplifiers, one for each channel, in a single built-in chassis with common controls. It has a power output of 30 watts, amplifies treble and bass responses equally in each channel for precise, undistorted high-fidelity sound with perfect balance. For complete information about Nutone products, mail the coupon below.

"Miracle Mat" Cuts Floor Maintenance Costs 40%

The "Miracle Mat," made by Progressive Engineering Company of Holland, Mich., automatically wipes shoes clean when people enter a building—cuts the cost of sweeping, mopping and polishing floors inside.

Tough brushes running beneath the heavy Kaiser Aluminum grille whisk away dirt and grime when the grille is stepped on. The brushes sweep through the grille opening at a rate of hundreds of strokes per minute, scrubbing shoe soles until the pedestrian steps off the mat.

The "Miracle Mat," complete with grille, electric motor, and catch pan for dirt, lowers into any opening in the floor—wood, concrete, stone or tile. It is available in three sizes for commercial use, plus two sizes for residential installation.

For complete information, mail the coupon below.

Please send me information on the products checked below:

☐ Nutone, Inc.

☐ The "Miracle Mat"

Kaiser Aluminum & Chemical Sales, Inc.
Dept. P-244, Kaiser Center, 300 Lakeside Drive
Oakland 12, California

Name_____

Address_____

City_____ Zone____ State____

KAISER ALUMINUM*

THE BRIGHT STAR OF METALS

*T. M. Kaiser Aluminum & Chemical Corp.

Aluminum Usage in Reynolds St. Lawrence Plant

Application	Pounds
Pot room cranes, conductor rails	248,732
Electric pot room bus bar	13,778,402
Electric conduit	292,398
Corrugated roofing, siding	1,226,852
High tension yard bus bar and structure	258,483
Warehouse building structure	92,106
Conveyor structure	839,957
Water tank (200,000 gal. 140' high)	47,485
Pot room ventilation doors	116,673
Pot room roof ventilator	718,770
Reduction cell accessories	565,567
Rectifier station bus bar	298,486
Other	516,089
Total	19,000,000

of the St. Lawrence plant production.

Aluminum that is not sold to Chevrolet-Massena is cast into 1000-pound pigs for use by other Reynolds plants, and in smaller sizes for independent processors of aluminum. Ingot and extrusion billet are cast in various sizes which may or may not be homogenized. Continuous-cast 4-inch square bar is produced for electrical uses.

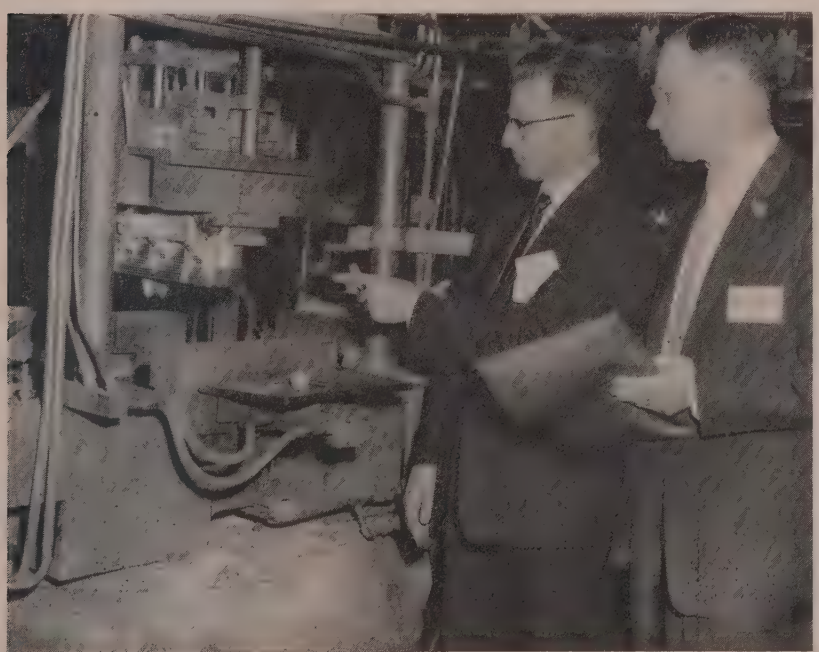
New and more efficient equipment has been designed to reduce or ease manual labor at the smelter. One example is a "pot puncher" for breaking crust formations on the top of each pot. This device is operated by a jack handle, eliminating use of the crowbar, and "reduces ten minutes of hard work to seconds," according to Vernon G. Kneeskern, St. Lawrence plant manager.

Another example is an "ore spreader" which speeds up and simplifies loading of alumina into the pots.

Electricity is a big cost factor in producing aluminum. Reynolds Metals has a 33-year contract with the New York State Power Authority for the purchase of 200,000 KW (firm) and 39,000 KW (interruptible) power. Reynolds also has a contract with Niagara Mohawk Corp. to supplement the interruptible power.

The cost of St. Lawrence-generated power is slightly over 4 mills per KWH, Reynolds reports. This is comparable to the cost of purchased steam power in the Ohio River area. However, Massena's hydroelectric power has the advantage of not being subject to the rising fuel costs normally associated with steam generation.

The physical plant is aluminum's own best promoter. The accompanying table shows the distribution of 19,000,000 pounds of aluminum in various forms used to construct the St. Lawrence reduction plant.



■ *Head for the Corvair engine is shown being produced by the low pressure casting process. One man manages four of these machines, one of which is on standby. The Chevrolet foundry at Massena, N. Y. has 36 of these machines.*

YODER
ROTARY SLITTERS

If your slitting requirements call for coil widths from 12" to 60", in gauges from .015" to .250", the economy of purchasing Yoder Slitting Machinery can be yours. Operating a Yoder Slitting Line only one eight-hour shift per week, for example, could easily produce 35 tons of slit strands per week...or 1,820 tons every 52 weeks. At a slitting cost saving of only ½¢ per pound, the annual savings would amount to $18,200.

Additional savings can be realized through lowered inventory of mill-width coils—less waiting for delivery of special slit widths. Also, customer satisfaction will increase as you achieve faster completion and delivery of finished products.

At your request a Yoder sales engineer will study your plant operation to determine what equipment would most economically...and profitably... serve you, whether it be standard components or a completely specialized and engineered line.

Send for Yoder's illustrated text on slitting operations and equipment. It describes methods, time studies, operating cycles, material handling, and gives full specifications.

THE YODER COMPANY
5539 Walworth Avenue • Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING ROTARY SLITTING LINES

Part 2:

THE ALUMINUM HEARINGS

Verbatim testimony of 15 representatives of industry and government is condensed in this report of the Yates Committee's four days of hearings held last May. Committee members were Congressmen Yates, Multer, Moore and Derwinski. Victor Dalmas was minority advisor. Part 1 (June issue) covered complaints of die casters, smelters, scrap dealers, and extruders. Part 2 reports testimony of a foil converter, siding makers, a Commerce Department official, and a Reynolds Metals spokesman. Part 3 (August) will have testimony of representatives of Chrysler Corp., Ford Motor Co., General Motors, Alcoa, and Kaiser Aluminum.

Competition From Reynolds Metals, Reynolds Tobacco, Kaiser Aluminum, Threatens Small Florist Foil Firms

E. H. Weder — Highland Supply Corp.

FIRST witness of the second day of the aluminum hearings was E. H. Weder, representing Highland Supply Corp., an aluminum foil converter specializing in florist foil. He described the company as a leader in the florist foil field with a total volume of slightly over $1 million per year.

Weder's long and pungent statement was directed against three companies — Reynolds Metals, Reynolds Tobacco and Kaiser Aluminum — who, he declared, are "forcing us to the wall, not by superior ability or efficiency, but because they are selling florist foil under the cost of production."

'Still in the Business'

Claiming that this had been proven in the FTC's case against Reynolds Metals, Weder said that the FTC had ordered Reynolds two years ago to get out of the florist foil business. "But Reynolds is still in the business, using tactics just as bad, and in some cases worse, than before," Weder complained.

Weder then recounted a history of competition in the florist foil field. Nearly ten years ago, he said, florist foil began coming into the country from Austria at 52 cents a roll for plain, 62 cents a roll for embossed. At the time, Highland's prices were $1.00 and $1.10, respectively. Italian-made foil also started coming in at the Austrian price.

Highland dropped its prices to 85 cents and 95 cents, and "we were able to pretty well maintain our volume and make a profit . . . although we lost some accounts."

Reynolds Metals entered the field around three years ago by buying Highland Supply's largest competitor, Arrow Brands. "Shortly after that they drastically reduced prices . . . in some cases under the import prices. . . . We were forced to either meet the Reynolds price or lose our accounts."

The price was later raised to the present 75 cents a roll — which is "still a losing figure," according to Weder. It rose another ten cents a roll later on, but Reynolds Tobacco invaded the market early in 1959, dropped the price to 75 cents, "contacted the entire trade, and grabbed off a considerable portion of the business. . . ."

Kaiser Aluminum entered the florist foil game early this year, "even though they had made a survey of the field and were aware of the limited potential volume; that prices were under their normal list prices; and that Reynolds Metals had been cited for unfair trade practices in this field. . . ."

Weder quoted "best authorities in the field" to the effect that florist foil volume would not exceed 2 million pounds per year, "which can hardly be enough potential to interest a big aluminum producer." Why, then, did these three big companies jump into the business? Here's Weder's theory:

"Reynolds Metals entered the field with the idea of taking over the entire volume and eventually making a good profit. This, in our opinion, was pretty well established by the FTC case . . ."

"Failing in this, and because of the possible far-reaching effects of the FTC ruling . . . in future acquistion of small business, it is our opinion that they were able to induce Reynolds Tobacco and Kaiser Aluminum to enter the florist foil field in order to strengthen their case in an appeal of the FTC ruling."

E. H. Weder

"I feel that we either need a different law or we need better enforcement."

Price Spread Shrinks

Weder went on to cite several other abuses. He noted, for example, that in a period in which mill prices of aluminum foil had risen more than 40%, the price of florist foil had declined more than 25%. He further contended that "the same is not true about any other foil produced by them for any other trade. . . ."

In conclusion, Weder assured the committee that he asked for no special favors from the government, but that he did ask that "big business not be permitted to use their colossal financial and other powers to crush small business by selling under cost and other unethical methods."

He called for a law "with stiff penalties" to prevent such activities, and another law to prevent large companies "from delaying and appealing a case indefinitely. . . ."

Chairman Yates thanked Weder for his statement, and began the questioning with a few queries about the size of the florist foil industry, type of foil used, and the like. Finally, he got down to business with this question:

Yates. Do you know whether (Reynolds Tobacco) is in any aluminum activity other than florist foil?

Weder. They sell foil to the convert-

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ing trade and they sell other types of converted foil. For instance, they sell laminated foil to the beer labeling trade.

Multer. Where do Reynolds Tobacco get their foil?

Weder. They roll it themselves.

Multer. Where do they get their raw metal?

Weder. I don't know. They probably either import it or buy it from some primary producers.

Multer. Are there any interlocking directors between Reynolds Metals and Reynolds Tobacco?

Weder. Not that I know of. . . .

Multer. You suggest we need additional legislation. You suggest a law with stiff penalties and a law preventing the "bigs" from delaying and appealing their cases indefinitely.

It wasn't so long ago that Congress did stiffen the penalties for antitrust violations. There is a $50,000 fine for each violation. After trial in a criminal court, if the grand jury indicts, the individuals running the corporation may be sentenced to jail for violation.

Do you think that law needs stiffening or better enforcement?

'There Is Something Wrong'

Weder. I am not familiar with all of the legislation. I may be entirely wrong, but I feel that there is something wrong; that we either need a different law or we need better enforcement.

I feel that there is something wrong, as in this Reynolds Metals case dragging on for an indefinite length of time, because in the meantime the parties who are being hurt are being forced out of business.

Multer. You wouldn't suggest a special law to cover this case?

Weder. Not at all.

Multer went on to point out that Congress does not pass a law or change a law just because of one bad case.

Yates added that Congress has looked into the matter of prolonged proceedings of the FTC with the hope of finding some cure. "I don't know quite how we can shorten it," he added, explaining that the respondent is entitled to take the case to court to determine whether FTC acted in accordance with the law. But he hoped "the courts will speed up those cases. . . ."

Weder replied that he did not intend to criticize the FTC; that the full commission upheld the examiner's ruling; and that Reynolds had asked for a hearing and was turned down.

"I understand that now it is being taken through the courts," he concluded. "This can drag on for a long time."

That ended Weder's testimony, and Yates called the next witness.

Expansion of Independent Siding Firm Stalled by Alcoa's Bid for the Market; Discriminatory Pricing Charged

R. A. Domar — U. S. Aluminum Siding Co.

The problems of independent manufacturers of residential aluminum siding were discussed by the next witness, R. A. Domar, vice president of U. S. Aluminum Siding Co., Franklin Park, Ill.

Domar had no prepared statement. He led off with observations to the effect that: The aluminum siding business had grown tremendously in the past five years; his company showed a 13% growth rate in 1959; a general expansion of the company's facilities was planned; and the primary producers assured him that their promotional programs would aid this expansion.

'. . . After Repeated Denials'

"All of a sudden," he added, "Alcoa came in, after repeated denials, as a producer of (residential siding)." Yates wanted to know what he meant by "repeated denials." Domar replied that when he heard rumors that Alcoa would enter the business he called (Alcoa) and was assured that their promotion "was geared to help us increase volume . . ."

All of this took place about a year ago, when U. S. Aluminum Siding was bidding for some of the business of National Homes, which switched to aluminum siding in its new line of prefab homes. According to Domar, Alcoa got the business "because we could not meet their price."

At the time, he said, "we were selling siding for $24 per square, and the story I can't verify this — was that National bought it at $19.75 or some such figure. I can't buy the metal for that. Metal alone costs me $22.70 per square."

After some preliminary questions, Yates asked for the date that Alcoa entered the siding business. Here's Domar's answer and ensuing testimony:

Domar. Last year. They did it originally on a contract basis to National Homes and then ran a full announcement in the Wall Street Journal toward the end of 1959.

Yates. They announced they were going into . . . manufacturing as well?

Domar. Yes.

Yates. What about Reynolds and Kaiser?

Domar. They have strongly denied their willingness to enter the field. However, they have flatly stated that if (Alcoa's) penetration of the market is such that our volume drops, Reynolds and Kaiser will have to enter in order to protect their position.

Yates. You stated that your company had envisioned a $1 million expansion program and that this was pursuant to (an assurance that) Alcoa was not going into the business. Did you actually engage in such a conversation with Alcoa?

Domar. Yes, many times. We bought from Alcoa. When I joined the company three years ago we were buying approximately 50% of our reroll sheet from Alcoa. Then gradually, we dropped down from Alcoa because . . . they didn't seem to have the desire to be merely a supplier of coil.

There followed a brief misunderstanding about the per-pound price of reroll stock vs. the per-square price of finished siding. Domar indicated that his company was selling siding at $21.95 per square at the beginning of the year, but that the price went up to $22.95 about a month later.

Yates then asked: "What was Alcoa selling siding for?" Here's Domar's reply:

Domar. A $22.95 price, but guaranteeing a 16% gross profit to their five chosen accounts, regardless of the market price.

Yates. When you say "five chosen accounts" what do you mean? Is there a special way that Alcoa went into this?

Domar. I understand they approached quite a number of the major roofing and siding manufacturers nationally. They signed five as distributors.

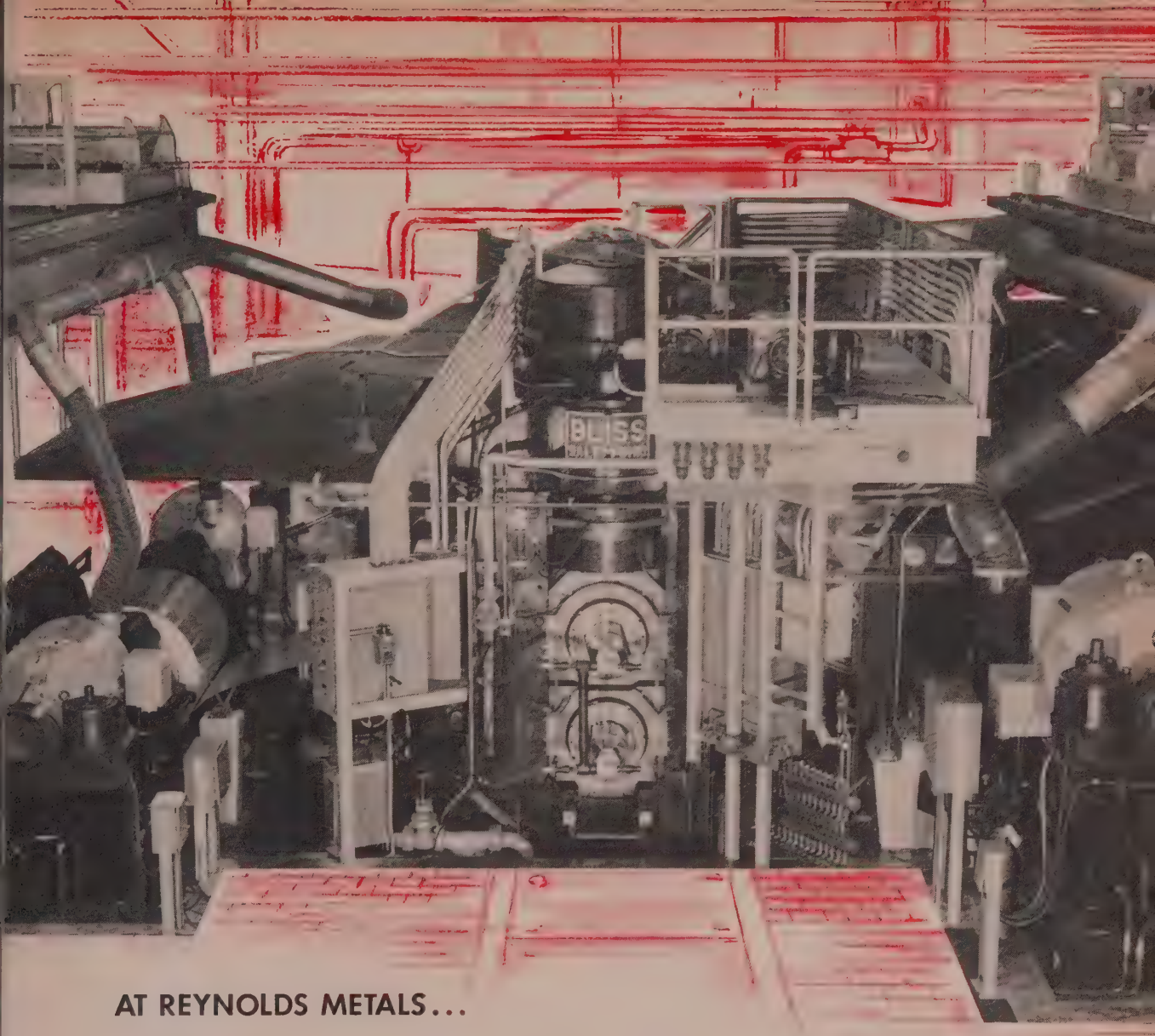
Editor's Note: The "five chosen accounts" were Barrett Division of Allied Chemical Corp., Bird & Son, Inc., Flintcote Co., Mastic Corp., and Philip Carey Mfg. Co. Altogether, these companies have some 25,000 dealers and dealer-applicators. The new Alcoa siding is sold through them exclusively.

Yates apparently could not understand why Alcoa's entry into the siding business imposed a hardship on independents if Alcoa's distributors sold at the same price as the independents, Domar tried to explain it this way:

About 30 Siding Makers

Domar. That price is not attributed to Alcoa. This industry has grown. From (the original) ten, I think there are now about 30 some manufacturers.

They have no basic advantage over us and we have no advantage over them, other than our own sales ability. . . . However, (we cannot compete with) Alcoa, being fully integrated and with their guarantee of a 16% profit, regard-



AT REYNOLDS METALS...

Unusual new Bliss mill helps meet growing demand for bright aluminum strip

First of its kind to be installed by Reynolds Metals Company for sheet operations, this new Bliss two-high cold reduction mill recently went into operation at Reynolds' Alloys Plant, near Sheffield, Ala.

A 66-inch mill capable of speeds up to 1000 fpm and reductions as high as 50%, the new mill has been especially designed for rolling bright aluminum strip, now being used in increasing quantities for both decorative and structural applications by the automotive, aeronautical, trailer and other industries.

Among the unusual design features built into the mill by Bliss' Rolling Mill Division are a continuous line flow coolant filtration system and a special heating arrangement that maintains the proper shape of the rolls. Electronic controls provide gage consistency in high speed acceleration and deceleration, as well as permitting the operator to detect difficulties at any point in the rolling operation from his position at the control panel.

According to Reynolds Metals, the new Bliss mill is part of a $65,000,000 expansion and modernization program now going on at the Alloys Plant.

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less of margin, to these dealers . . . we couldn't guarantee anybody a 16% profit. We can't guarantee it to ourselves.

Working backward from the current price of $22.95, that means Alcoa is selling siding to these five at $19.28. . . . If I buy coiled sheet from Alcoa at the current price I would pay, just for material — no fabrication or packaging charges or advertising, sales, administration, or general overhead — $20.72. They (Alcoa) are selling (siding) for $19.28.

Dalmas. Do these five manufacturers process these coils the same as you do?

Domar. No. They are merchandisers. Alcoa ships it to them completely packaged, ready for resale.

Dalmas. But you take the coils and do your own manufacturing?

Domar. Yes.

Yates. Is there anything else you want to tell us about this situation?

Domar. We feel — and we have discussed this with the Aluminum Siding Association — that there is a definite unfair pricing, a subsidization, that we cannot compete with. Now, if Alcoa sold at $22.95, as we would have to sell to these same manufacturers, I don't think there would be much of it.

Yates. Are they selling it for less than $22.95? I am thinking of sales to the public.

'Lost One in Denver'

Domar. I don't know. But I got a report yesterday from our salesman in New England that one of those five has quoted a price below that $22.95 and is thereby threatening to take one of our accounts.

We have lost one in Denver due to a price that we can't meet.

Dalmas. These manufacturers' agents apparently are selling the merchandise and carrying the account.

Domar. Right.

Dalmas. Would you say that sales and carrying costs would equal 16% of the sale price of the product?

Domar. No. I do not think it should exceed maybe 12%. That is with burden and so forth, in our case. As I say, we do not have the depreciating factor of capital equipment.

Some of these accounts will go well into 120 days, and I am sure you know the value of money on the market today. Credit is a loan, which is costly. We just do not have the profit margin to carry many accounts to that extent.

Yates. They have a great leverage that you do not have?

Domar. Yes, their available cash, their integration, their name and facilities.

That concluded Domar's testimony. Yates then called the next witness.

Alsco's Siding Profit Was Slashed When Building Sheet Trimmed the Price Spread Between Pig and Reroll Stock

Harry Sugar — Alsco, Inc.

The next witness was Harry Sugar, president of Alsco, Inc., Akron, Ohio. Like the previous witness, Sugar complained about the manner in which Alcoa had entered the residential siding business. Alsco, however, has more to lose because the company had integrated back to the ingot stage. All other independent siding firms start with reroll sheet.

Harry Sugar had no prepared statement. Portions of his testimony follow.

Sugar. Primarily we are in the aluminum extrusion business, making windows and doors. We are also in the aluminum siding business.

Yates. What are your facilities?

Sugar. We start with the pig, or rolling slab, and process from that point.

Yates. How long have you been in business?

Sugar. We started in 1946. . . . We have been in and out of the siding business since 1949. We really made a push into this business in 1955.

Yates. Did you buy coil?

Sugar. We bought coil and reroll stock at the time (1955).

Yates. How many companies were in the siding business?

Sugar. A half dozen.

Yates. How many are in it today?

Sugar. Outside of the smaller independents, I would guess 30 or 35. I am talking about those who have their own paint lines or other facilities for fabricating a finished product. . . .

The smaller independents are those who buy a coil of painted stock and merely fabricate one item and buy the other materials from other manufacturers.

Yates. Were any of the Big 3 competing with you?

Sugar. Not at that time.

Yates. Have any of the Big 3 moved into the siding business now?

Sugar. Alcoa did in the last few months.

Yates. Had you received assurances from Alcoa that it would not compete with you in this business?

Sugar. Yes, on many occasions. We would hear rumblings and would ask, and their answer has been: "We do not compete with our customers."

We first heard about it early last summer. But we could never pin it down until, I would say, last October, when we heard that they were taking away our largest single account, Mastic Corp. We received a letter from Mastic cancelling our supply contract, which had a 90-day cancellation clause.

Harry Sugar

"I think Alcoa went into the siding business due to the fact that their share of the market was estimated at less than 10% . . . "

After some discussion about the price of reroll stock, Yates asked the witness why Mastic cancelled its contract. Here's Sugar's reply:

'They Had a Better Deal'

Sugar. They had a far better deal from Alcoa. . . . Alcoa's price to them was whatever the industry was selling for (and) their discount would be 16 to 20% from that.

Yates. What would that be in terms of actual price?

Sugar. The price figured out, not including advertising allowances or any other sales aids, about $18.65. Our price was $20.75.

Multer. What about credit terms?

Sugar. Mastic told me that they could receive anything they wanted — 90 days, or if they needed it, 120 days.

Multer. What were yours?

Sugar. Twice a month.

Harry Sugar then showed the committee several trade paper ads promoting Alcoa's siding arrangement with the five building products firms mentioned by the previous witness. This led the discussion off on several tangents, during one of which the witness pointed out that a year earlier Alsco had successfully sold a $4 million bond issue for the purpose of expansion in the siding field.

"At that time," said Sugar, "we had

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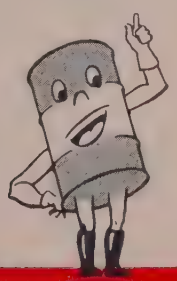

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no knowledge that we would have such a major competitor who would use other parts of its business and subsidize (siding) to compete with us at a price that we could never sell for."

Yates observed that he had heard that Alcoa had wanted to buy Alsco. Sugar said there had been some discussion, "but nothing on an official basis."

After some more extraneous discussion, Yates asked this question:

Yates. Do Mastic and the other companies sell aluminum siding for the same price you sell it?

Same Price, But . . .

Sugar. They do. But with the spread that they have, they have lots of room to make all kinds of deals.

Yates. What are your costs?

Sugar. We have a different situation than most of the others because we are more integrated. During the period when Alcoa started to make big deliveries, we showed a substantial loss because we had to spend more on promotion, sales help, men in the field, to try to overcome the tremendous program Alcoa is offering to the same customers through their distributors.

I would say that the smaller operator who buys coil cannot manufacture and sell at the $22.95 price. It costs him more than that. We figured the metal costs at over $20 a square, not including scrap, boxing, labor, overhead, sales costs, advertising, credit losses, and everything else.

Yates. Is siding your principal product?

Sugar. Yes. That and storm windows and doors.

Yates. What about windows and doors? What is the story on that?

Sugar. The industry is so demoralized there is nothing left. It is hard to break even. We had a very substantial loss in that division this past year, and we are trying hard to come up with new —

Yates. Why did you have a loss?

Sugar. Primarily, prices were too low. But a good part of it is due to . . . the way we were operating. . . . We are in the process of making changes.

Yates. Do you find the same type of competition in storm windows and doors?

Sugar. No, none of the big three are in that field.

Yates. Isn't that surprising?

Sugar. They have always told us they would not go into end products.

Multer. That is what they told you about siding, too.

Sugar. Yes, but siding looked like a very rich plum.

The main reason, I think, Alcoa went into (the siding business) is due to the fact that their share of the market was estimated to be less than 10%.

Yates. What about Kaiser and Reynolds? Will they have to go into it to compete with Alcoa?

Sugar. Kaiser people have told me repeatedly they have no intentions of going into the business. They may be forced to if they lose their customers to a degree where they have to protect their sale of metal to the market.

The witness later revealed that Alsco had tried several times to sell aluminum siding to National Homes, but always got the same answer: "If you can sell it to us at $19.75 we shall buy it." Sugar told the committee that "we could not even entertain the idea" of selling siding at $19.75 per square. Yates then asked:

Yates: Were they offered it at $19.75?

'We Did the Manufacturing'

Sugar. It is our understanding that Alcoa sold it to them at that price. We did the manufacturing for Alcoa and charged them $22.50. We sold it to Alcoa and shipped it to National.

Multer. And Alcoa absorbed the loss?

Sugar. As far as we know.

Yates. How much of a contract was it?

Sugar. We shipped them 25,000 squares last year, which would mean, at our price to Alcoa, about $575,000.

Yates. When did this take place?

Sugar. I think the last shipment was in January or February of this year. Alcoa had a lot of problems in manufacturing. In fact, it is our understanding they do not make it yet. They are having it made for them by different manufacturers across the country.

Multer. Are they paying them more than their delivery price?

Sugar. I have no idea. . . .

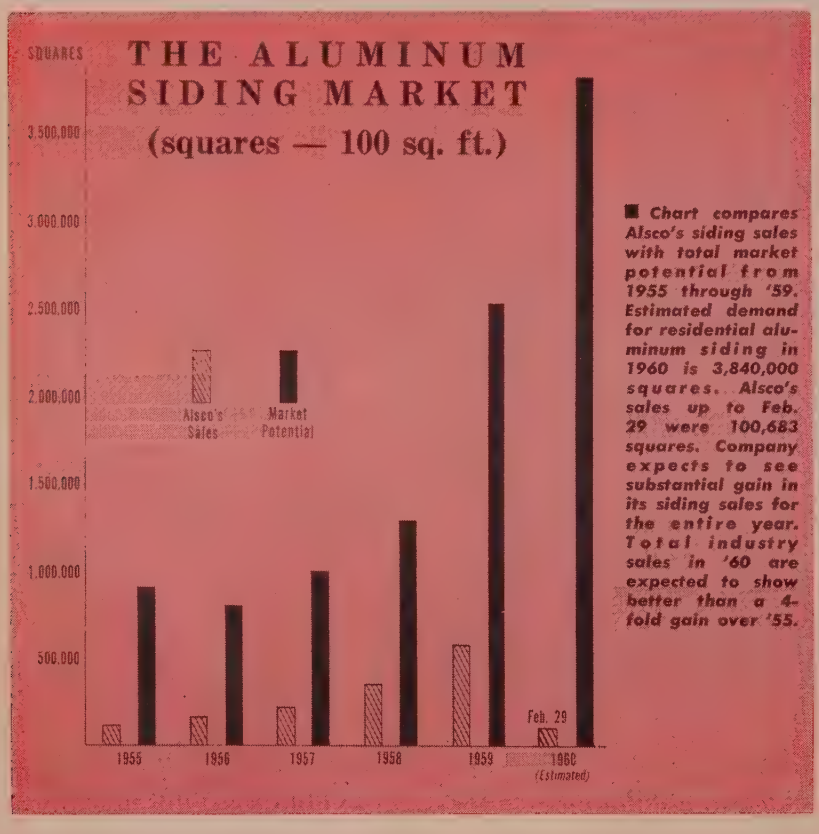
At this point the witness attempted to clarify the recent aluminum price fluctuations that had put his company at a competitive disadvantage. As noted earlier, Alsco has hot rolling facilities; it starts with raw pig or rolling ingots. Its competitors start with either reroll sheet or precoated sheet.

Sugar noted that from August 1958 to December 1959 the price of 99.5% pig — his raw material — was 24.7 cents a pound, while 3003 siding coil — his competitor's raw material — was 39.5 cents a pound.

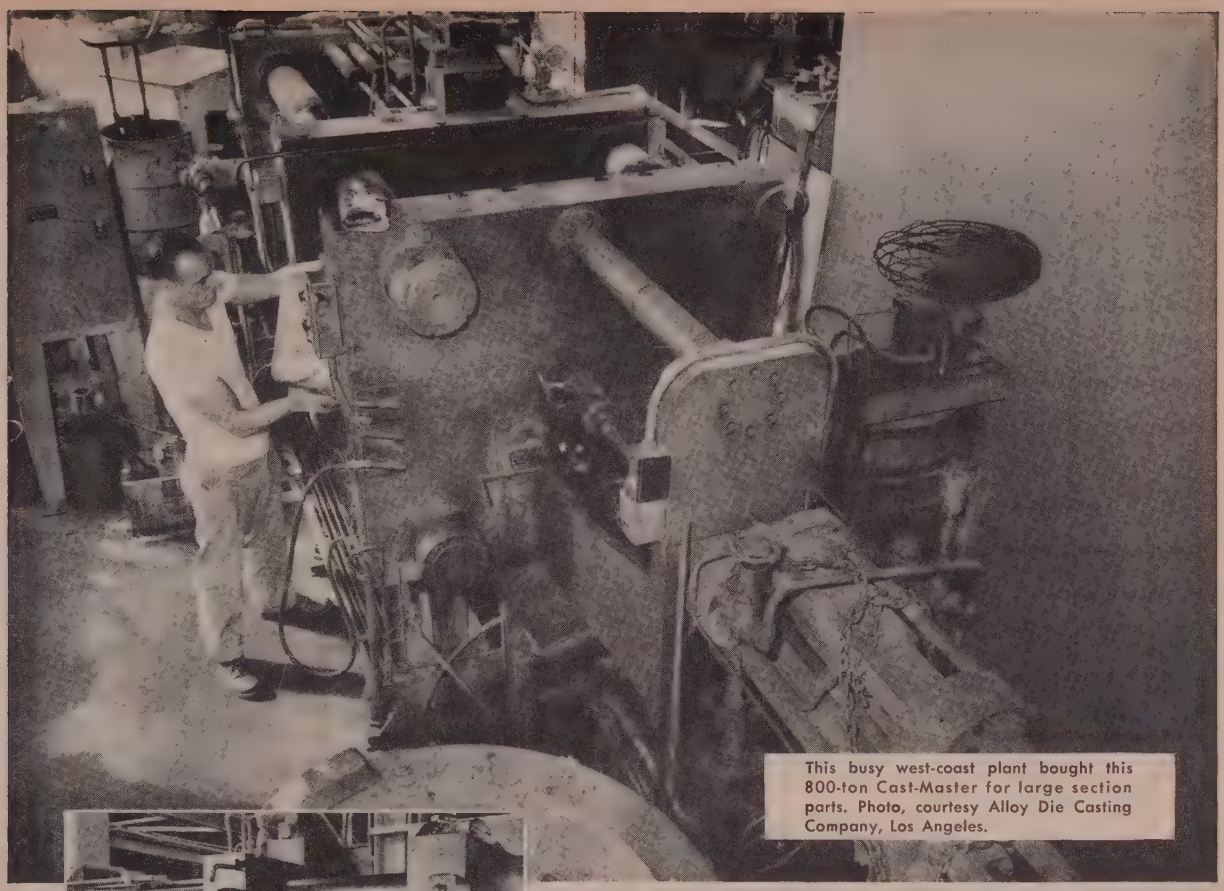
In October 1959 Alcoa brought out a new grade of building sheet — actually identical to 3003 siding coil, according to Sugar — that was tagged at 35.5 cents a pound. The price of pig remained the same until December 1959, when it was hiked to 26 cents a pound.

But when the price of pig was raised, the price of building sheet was increased to 37.3 cents. Thus, according to Sugar, the less integrated siding makers still had the price advantage that had resulted from the introduction of so-called building sheet.

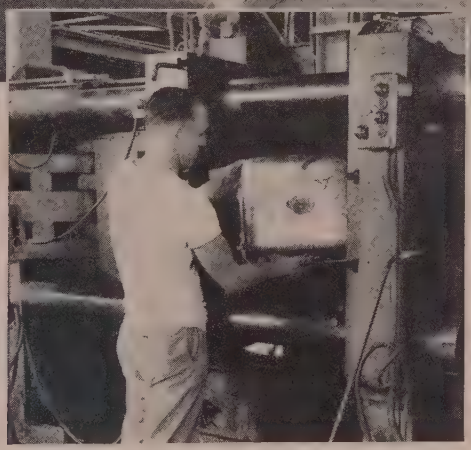
The lower priced building sheet soon had its effect on siding prices. Alside — the biggest independent siding producer — responded to lower prices be-



■ *Chart compares Alsco's siding sales with total market potential from 1955 through '59. Estimated demand for residential aluminum siding in 1960 is 3,840,000 squares. Alsco's sales up to Feb. 29 were 100,683 squares. Company expects to see substantial gain in its siding sales for the entire year. Total industry sales in '60 are expected to show better than a 4-fold gain over '55.*



This busy west-coast plant bought this 800-ton Cast-Master for large section parts. Photo, courtesy Alloy Die Casting Company, Los Angeles.



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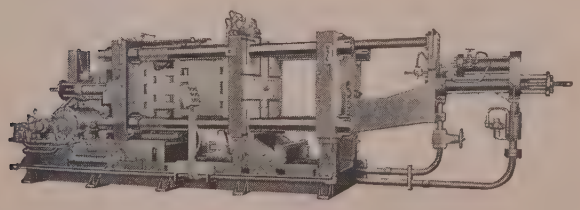

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ing quoted by smaller siding outfits by dropping its price from $24 per square to $21.95. That was in October 1959. Alsco met this price in November.

Sugar voiced the general fear that Alcoa's move into the siding business will force many of the smaller independents out of business, "although I feel sure that that is not Alcoa's prime intention."

The next several minutes of discussion added no significant new information, but toward the end of Harry Sugar's testimony, Victor Dalmas initiated this line of questioning:

Dalmas. I am interested to know the steps that you go through from the time that you melt the pig until you get to this coil that we are talking about.

Sugar. Primarily we start off with pig or ingot, which is put through our melting process and cast into what we call a rolling slab. We then heat this slab and put it through a hot rolling process. This reduces it from five or six inches thick, and coils it. Then the coil is annealed and goes to the cold rolling mills, which bring it down to the desired thickness, .024-inch, which we presently use.

Dalmas. Can you figure out what the price of this coil should be after these various steps? What does it cost you?

'Our Cost: 8 Cents a Pound'

Sugar. I would say that our cost of processing through the finished sheet is 8 cents a pound.

That concluded Harry Sugar's testimony. However, Alsco's general counsel, Saul Goodman, wished to add something. He informed the committee that although Sugar did not believe that Alcoa intended to drive independent firms out of the siding business, "it was their intention to change their policy (and) the same effect on the small businessman would result."

He suggested that the producer might be selling raw aluminum at a high price to make a profit "and then subsidize . . . the production of siding, even at a loss to themselves, in order to gain a foothold in the market at the expense of small fabricators of siding."

Finally, Goodman pointed out that even if Alcoa discovers later on that it made a mistake in entering the siding business, its action will still have hurt the independent firms.

"If Alcoa would stop now, before it is too late, the hurt would not be as great as if they discover a year or two later that they should not have gone into the business in the first place. . . ."

Chairman Yates then called the next witness.

With Scrap Supply-Demand in Balance, Smelters' Stocks High and Prices Stable, Export Controls Aren't Needed

W. A. Edwards — Department of Commerce

Exports of aluminum scrap were the principal concern of the next witness, Walter A. Edwards, Deputy Assistant Secretary of Commerce for Domestic Affairs. His statement was, in effect, a reply to the earlier testimony of Carl Burton, secretary of the Aluminum Smelters Research Institute (see MM, June '60, p. 34).

Burton had asserted that increasing exports of aluminum scrap were a threat to the raw material supply of the aluminum smelters, and he urged that export limitations be imposed by the Department of Commerce.

Edwards acknowledged that aluminum scrap exports "are continuing at a relatively high rate," but added that "domestic supply and demand are in balance and are expected to remain so." This led the Department to conclude that "aluminum scrap is not in short supply" and the "exports have not prevented domestic industry from acquiring adequate scrap."

Thus, the Department decided that export controls were not necessary.

Getting down to particulars, Edwards cited a table which showed aluminum scrap exports averaging about 37.3 million pounds per year from 1955 to '58, then rising sharply to 64.8 million pounds in '59. West Germany, Italy and Japan took the bulk of the exports, he said.

Scrap exports in the first four months of 1960 averaged about 11 million pounds per month, but, according to Edwards, a significant portion of this consisted of runaround scrap generated by the aluminum producers. "It is questionable whether much of this scrap would find its way into the hands of the secondary smelters if it were prevented from being exported," Edwards added.

To buttress the Department's stand against limitations at this time, Edwards noted that exports amounted to only 4.1% of total scrap supply in 1958 and 5.6% in '59. And though they amounted to 9% and 11% of supply in January and February of this year, these shipments included the previously mentioned runaround scrap.

Since this material doesn't appear in domestic supply statistics, it should also be excluded from export statistics for proper comparison. In that event, "the percentage for 1960 would be reduced substantially," Edwards explained.

W. A. Edwards

"Scrap inventories of smelters are holding high, which indicates that there is no shortage."

Additional arguments against export limitations include the fact that smelters' scrap inventories at the end of 1959 "were higher than for any of the preceding six years"; and the fact that scrap prices have remained stable, indicating a balance between supply and demand.

Edwards concluded with the observations that limitations "without demonstrable justification" would be "inconsistent with a program for expanding U. S. exports"; and that "if we are to be successful in persuading other countries to remove or reduce their restrictions on trade . . . we ourselves must avoid engaging in similar restrictive practices."

That ended Edwards' prepared statement. His question-and-answer testimony was uneventful. Portions of it follow:

Yates. Are export declarations required for shipments of scrap by companies that have affiliates in other countries?

Edwards. Yes, any export of scrap.

Yates. There has been, as you point out, a very significant increase in scrap during December. . . . If this keeps up during the current year, it will be the greatest year of export aluminum scrap in the last eight years, will it not?

Edwards. I believe so. Of course, we went to these countries, through our embassies, and asked the biggest users — primarily West Germany, Italy, and Japan — what the situation was in their

(Continued on page 56)

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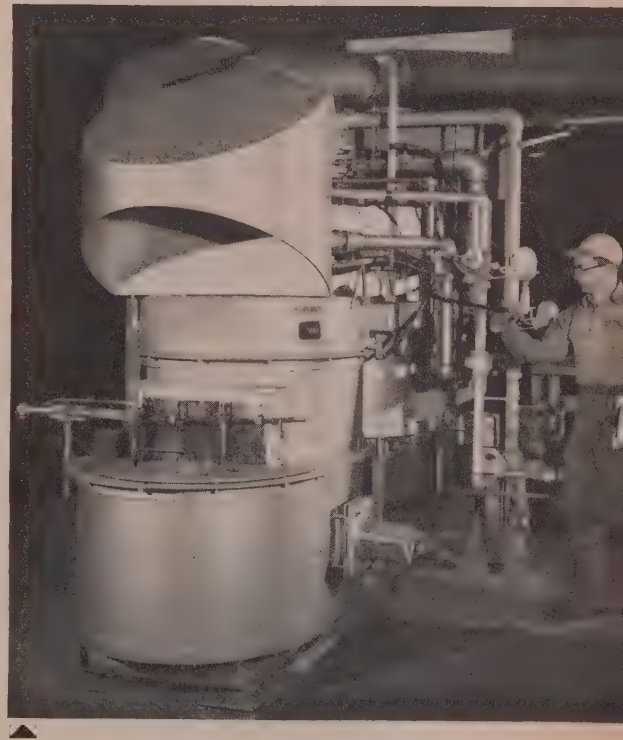

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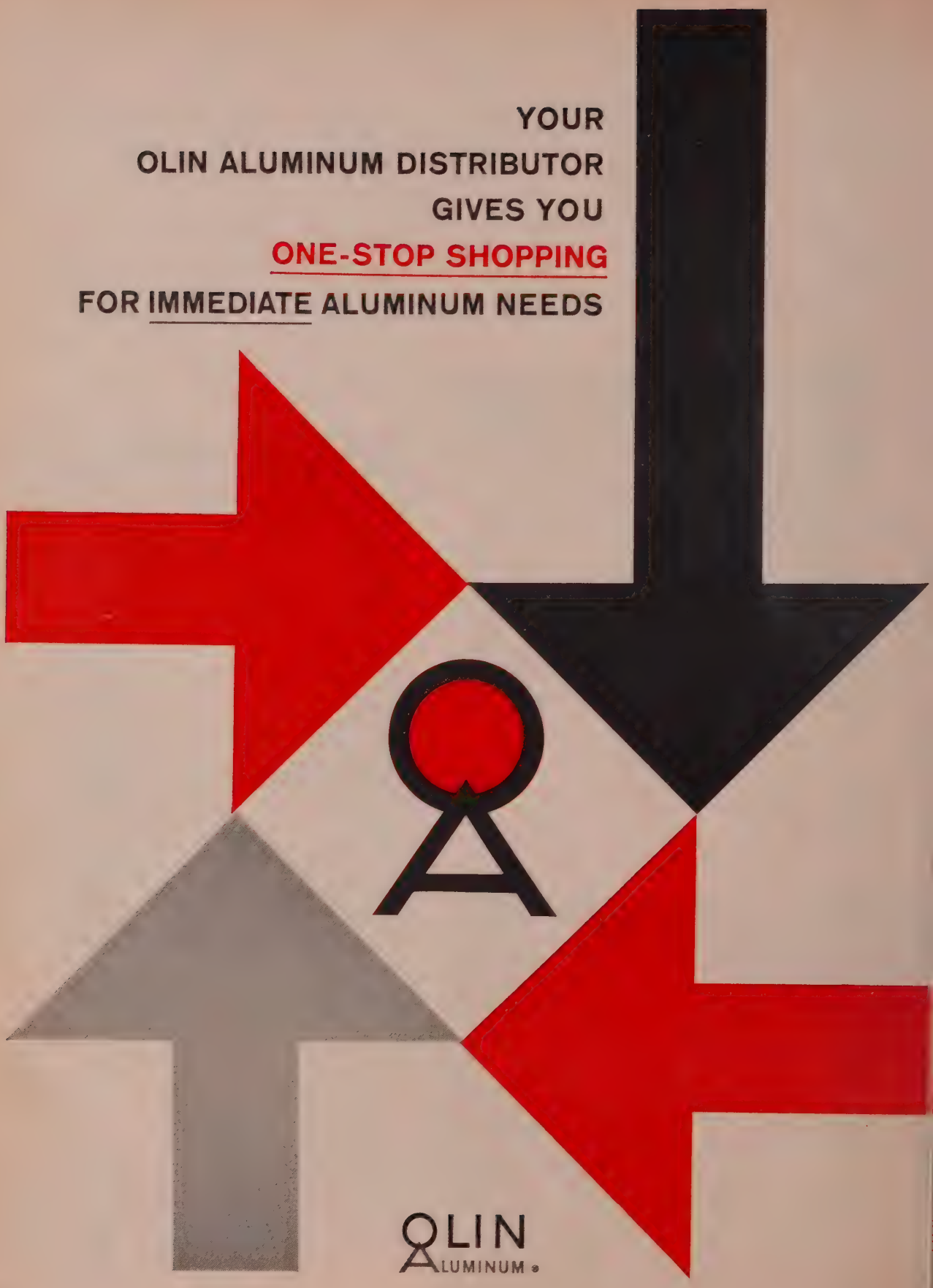

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countries. A reply from West Germany reads, in part:

"Association official estimates some increased scrap aluminum imports into the Federal Republic will take place this year compared with 1959 but estimated total of 1960 requirements will not continue anywhere near same rate noted for period January 1-April 20. All aluminum scrap imports will be for domestic consumption."

That is about the same reply we received from Japan.

Yates. The demand in West Germany will fall off?

Edwards. As of the second quarter of this year.

Yates. Is that true of Italy?

Edwards. Italy did not have any statistical data. . . .

'Supply in '60 Will Be . . . '

That ended the day's testimony, but Edwards was called back the following morning to answer questions posed by Congressman Multer. After an unsuccessful attempt to discover how much "runaround" scrap was being exported (most of it was shipped by one primary producer, Edwards explained, and therefore constituted "confidential data"), Multer asked this question:

Multer. Do we have any idea of what the production of domestic scrap will be in 1960?

Edwards. In January it was 100 million pounds. It is estimated that in February it was 96 million, and we estimate March and April at 96 million.

Multer. What is the estimate for the entire year?

Edwards. We should estimate about 1.2 billion pounds.

Multer. Well, if you found it necessary to impose controls as the result of some 78 million pounds of scrap exported in 1954, and 65 million pounds in 1959, immediately after taking them off—with an estimate of 120 million pounds for 1960, don't you think the time has arrived to call a halt again?

Production is going to go up to 10% and we are going to have 50 million pounds more exported than in 1954, and that will be almost double of what it was for 1959.

Edwards. Some of the explanation is to be found in Table 1 of my statement. The prices were going up quite rapidly in 1955 and '56. In 1954 the price was as low as 13.25 cents per pound. It went up to 24 cents in 1958.

Multer. What is it now?

Edwards. Around 17.5 to 18 cents.

Multer. Is there any change from last year?

Edwards. Almost none.

Multer. Isn't it fair to assume that in West Germany, Italy, and Japan their demand for aluminum is going to increase?

Edwards. Very much so . . . Although their consumption of aluminum may go up they are expected to import much more primary aluminum and generate some of their own.

'They Don't Want Controls'

Multer. Well, rather than rely on the statement that these foreign countries have given us, I think we have got to be more realistic about it. . .

After all, when our embassy inquires: "How much scrap do you expect to use the balance of this year?" . . . I don't think they would say anything else except: "We don't expect to use as much," because they don't want to see restrictions imposed.

Edwards. If you will refer to our Table 1, exports are going on now at the same rate as in December 1959. Scrap inventories of smelters are also holding high, which indicates that there is no shortage.

Multer. Can you tell us whether or not the determination to do nothing at this time with reference to export controls on aluminum scrap is the judgment of the Department of Commerce or has it, at least in part, been influenced by either the State Department . . . or the Treasury Department?

Edwards. This is by the Department of Commerce.

That concluded Edwards' testimony, and Yates called the next witness.

Price Squeeze Caused by Extruders' Own Price Cutting; Reynolds Willing to Discuss Sincere Hot Metal Inquiry

J. H. McConnell — Reynolds Metals Co.

The first testimony of a primary aluminum producer was given by the next witness, Joseph H. McConnell, general counsel of Reynolds Metals Co.

McConnell briefly described aluminum developments in specific market areas. In the automotive field, for example, he noted that the most significant development last year was the aluminum engine in the Chevrolet Corvair; that at least two more lines of cars will have aluminum engines in 1961 models; and that "within three years every major American car manufacturer will have at least one line of aluminum engines."

How Hot Metal Helped

McConnell indicated that Reynolds' molten metal contracts with auto makers did much to make this breakthrough possible. He intimated that this, in turn, stimulated the use of aluminum in other auto parts, thus bringing "increased business to secondary smelters, aluminum foundries, and non-integrated fabricators."

As an example, one of Reynolds' hot metal customers switched to aluminum transmission cases in 1958 and "this largest single aluminum casting component is now being manufactured by at least three non-integrated sources. . ."

McConnell quoted American Die Casting Institute statistics showing that aluminum die casting production last year rose 29% over the 1958 level. He also noted that passenger car production was up 32% while use of aluminum die castings in cars increased 38.3%.

The automotive industry used 145,000 tons of aluminum in 1957, is expected to use about 230,000 tons in the current model year, and "if 1961 is a good year for autos this should increase to 300,000 tons," McConnell said. "By 1965 the figure should be about 650,000 tons — an increase of 180% over this year."

Turning to the construction industry, McConnell said that aluminum usage rose from 462,000 tons in 1957 to 600,000 tons last year, and should reach 700,000 tons in 1960. He attributed these gains largely to the research and promotional efforts of the primary aluminum producers, and traced the benefits of these efforts to "numerous non-integrated fabricators."

After mentioning several new aluminum applications in the electrical, petroleum and packaging industries, McConnell turned his attention to the points of inquiry outlined by Chairman Yates at the outset of the hearings — "The extension of hot metal contracts, accelerated mergers and expansions, the complaints of an alleged price squeeze . . . and the increase in the export of scrap."

FTC Case Overplayed

As for hot metal contracts, McConnell revealed that there had been no extension of Reynolds' contracts — that, in fact, the one with GM at Jones Mills, Ark. was due to expire June 30, and that Reynolds was negotiating for an extension of the pact.

He also stated that Reynolds had not had any mergers or domestic acquisitions of any significant size; that the acquisition of Arrow Brands had

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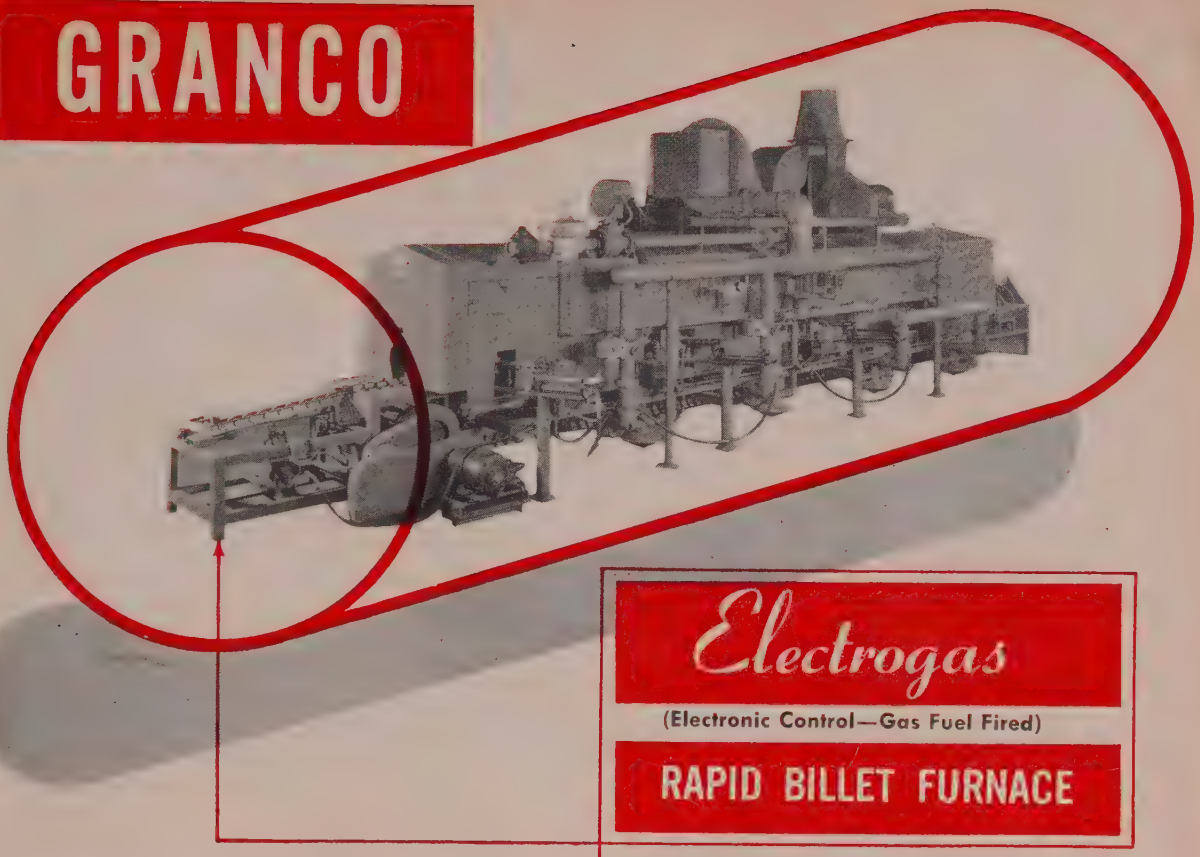

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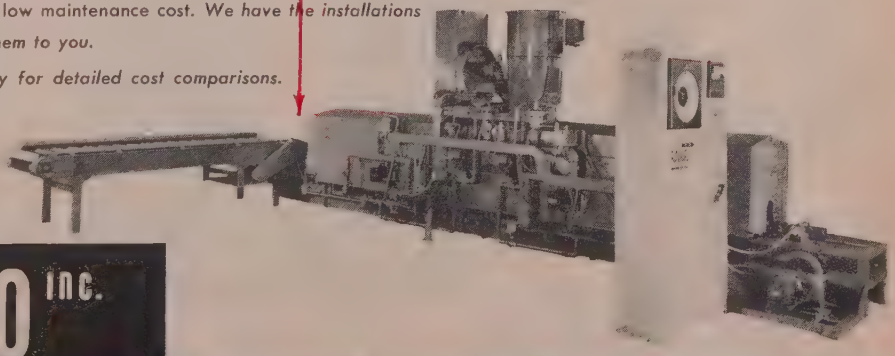

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"received more attention than the matter deserves"; and that since the FTC decision is now pending in the Court of Appeals, "I do not believe it would be appropriate for me to discuss . . . the case."

As for the price squeeze, McConnell found it "difficult to talk about something which does not exist." He noted what he called "the completely false charge that three of the primary producers are trying to force the independent extruders out of business," and reminded the committee that "no group in the aluminum industry has grown as the independent extruders have."

As proof of this, McConnell cited government statistics showing that extrusion output had more than doubled in the past five years, while the number of extruders had grown more than 52%; that the share of the market commanded by independent extruders had increased from 34% in 1950 to 54% in '59.

"Between 1950 and 1959 their output increased 465% while shipments of extrusions by the primary producers had gained 150%," McConnell added.

Reynolds does not control the prices of extrusions, he asserted. "The price levels, in reality, are determined by the independent extruders. . . It is fairly safe to assume that if the price of pig were reduced, the independent extruders would lower the prices of extrusions and the margin between the two would remain substantially the same as now."

Costs Out-Gain Prices

As for the price of pig, McConnell pointed out that it is no higher than it was 2½ years ago. "Without including the last round of wage increases, the composite of the aluminum industry's major cost items is up 93% from the 1947-49 base period average, but the composite of major product group prices is up only 51%," he explained.

Continued expansion of the aluminum industry will require substantial expenditures for product and market development, McConnell continued, and "the money must come from adequate prices for the whole range of aluminum products." On the other hand, prices must be low enough to compete with other materials.

In conclusion, McConnell told the committee that his company does not export any aluminum scrap.

Yates started the questioning with a reference to the charge, made by the American Die Casting Institute, that Reynolds' hot metal contracts had diverted automotive business away from the independent die casters. ADCI's spokesman had submitted a chart (see MM, June '60, p. 32) purportedly showing the percentage of automotive business thus lost by the independents.

McConnell conceded that the percentage figures in the chart "would tend to justify his conclusion," but indicated that factors other than hot metal contracts might account for this apparent loss of business.

Yates then advised the witness that the Central Foundry Division of GM had run advertisements to sell die castings, and wondered if this was due to the hot metal contracts. McConnell doubted it, but said the auto makers themselves should answer that.

'Why Were They Turned Down?'

Yates then reminded the witness that Leonard Starr had testified that he had tried to get a hot metal contract from Reynolds for the independent extruders (see MM, June '60, p. 43). "Can you tell us why they were turned down?" queried Yates. Here's McConnell's reply and ensuing testimony:

McConnell. I don't know that he was being turned down. I don't know that he made an offer to buy.

Yates. He offered to negotiate.

McConnell. He wrote a "certified letter" to us in which he indicated that he had some possible interest in negotiating with us for hot metal.

I rather took it, when he sent the certified letter, he was somewhat more interested in writing the letter than he was in negotiating. We never have heard from him since that correspondence in 1958. . .

Yates. You have a feeling then, this was not an offer in good faith?

McConnell. I don't want to say it wasn't in good faith. I just don't—

J. H. McConnell

"It is fairly safe to assume that if the price of pig were reduced, independent extruders would lower the price of extrusions."

Yates. You just indicated he was more interested in letter writing than—

McConnell. I don't know that it was a serious offer, but I wouldn't say he operated in bad faith.

If They Want Hot Metal . . .

Yates. Suppose the extruders did want to enter into a hot metal contract. Would Reynolds be interested?

McConnell. I think we would. Whether or not we would be after we investigated it in complete detail, I would be unwilling to say at this time. There are quite a few ramifications to the molten metal contract.

Yates. I wondered as to what the basis for a hot metal contract might be.

McConnell. Well, it involves a very heavy commitment on the part of the purchaser. . .

Yates. Well, the correspondence indicated that there was not any serious acceptance on the part of Reynolds. Was there not that intimation in it?

McConnell. I don't think anything very conclusive happened.

The proceedings continued in this vein for a while without bringing out anything new, until Yates brought up the subject of the alleged price squeeze. He quoted Leonard Starr's charge that the producers had raised the price of 6063 extrusions by only 10% in the same period that they had boosted the price of pig by 34% and billet by 36%. Yates wanted to know why. Here's McConnell's reply:

McConnell. The extruders fixed these prices. . . We can't sell for any more than they sell for. That is why (extrusion) prices don't go up.

Yates. Then the independents exerted price leadership?

McConnell. Certainly. . .

Yates. Is it not unusual that the extruders would keep this level for their product when the price of pig or billet goes up?

McConnell. I don't know whether it is unusual or not. It happens to be the case.

Yates. When you increase the price of pig, do you also increase the price of 6063 billet?

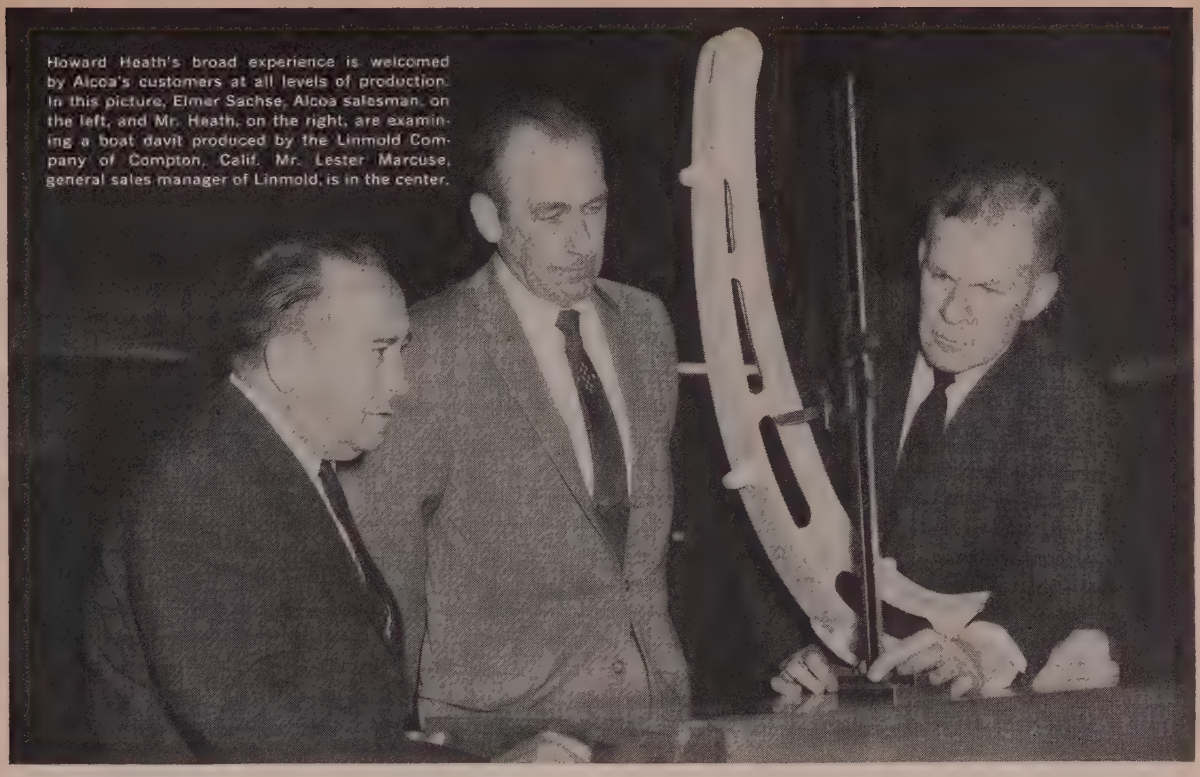
McConnell. Yes.

Yates. Did you also increase the price of extrusions at that time?

McConnell. Efforts were made to increase the price of extrusions at that time, but the efforts did not prevail because the independent extruders did not increase their price.

Nothing new was brought out by the next few minutes of testimony, until Congressman Multer brought up the subject of Arrow Brands, the Florist Foil concern that Reynolds had purchased **(see page 44).**

Multer wanted to know who reduced



Howard Heath's broad experience is welcomed by Alcoa's customers at all levels of production. In this picture, Elmer Sachse, Alcoa salesman, on the left, and Mr. Heath, on the right, are examining a boat davit produced by the Linmold Company of Compton, Calif. Mr. Lester Marcuse, general sales manager of Linmold, is in the center.

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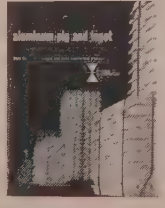

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florist foil prices first—Arrow Brands, under Reynolds management, or the independents. McConnell's reply: "We thought we followed the price initiated by importers of florist foil. . ."

Yates then brought up the subject of commodity prices. "What is a commodity price?" he asked. McConnell replied:

McConnell. A commodity price is a price fixed for a particular segment of some industry. An example is the price of can stock for the canning industry. There is one price which applies only to can stock.

Yates. Are these prices generally lower than published prices?

McConnell. Sometimes. . .

Yates. Mr. Starr says the commodity price for 6063 extrusions to the truck-trailer industry are 4 cents a pound below published prices.

McConnell. That could be. . . Most of these things are brought about by competition with other metals. We are competing in the canning business with tinplate. We are competing in the truck body situation with steel and other metals. We have to meet that competition.

Yates suddenly brought up the subject of sales of primary aluminum abroad. McConnell acknowledged that Reynolds sells some metal in foreign countries; that "we have to sell at the prevailing market price" over there; and that the price is sometimes lower and sometimes higher (in Italy, for example) than in the U.S.

'There's a Differential . . . '

The introduction of this subject occasioned a brief dispute between the witness and Multer. The Congressman wanted to know how Reynolds could sell primary pig abroad at 23½ cents a pound when the U.S. price is 26 cents. "There is a differential that our people at home should not be required to pay," he declared.

McConnell replied that perhaps "the only answer for us is not to sell abroad, which would mean our costs here would go up. . ."

Multer wouldn't buy that. He suggested that some of the metal is coming back into this country at below the market price, even after the cost of a round-trip ocean voyage. "It comes back only because the market needs it," he added.

McConnell disagreed, pointing out that "we have an oversupply of aluminum in the U.S. today." This prompted Yates to ask:

Yates. May I interrupt? If you have an oversupply why was there a price increase?

McConnell. Because costs have gone up substantially.

Yates. It was pointed out in Mr. Starr's testimony . . . that in 1949 costs in material, power and manufacturing were about 11 cents a pound to produce primary aluminum pig which was sold for 16 cents in the U.S. These costs are now about 15 cents a pound for pig which sells for 26 cents a pound. Even if one cent is added for U.S. freight this price provides a margin of about 60%. Is this erroneous?

McConnell. Certainly. He has used what is called the mill cost price. He has not added anything for selling, research, administration expenses, advertising, all of the necessary things that go on top of that. The production of aluminum today is not a profitable business in the sense of being at the point where people want to invest large amounts of capital for a high rate of return.

Yates. Why are so many companies going into it?

McConnell. I don't think so many companies are going into it now. Some have in the last three or four years.

'What's Your Mill Cost?'

Yates. What portion of your total cost is your mill cost?

McConnell. That would tell what our complete costs are. If you like, I will give it to you confidentially.

Yates. All right. I was just interested. I understood that the cost of manufacturing in most industries would be the major part of the costs. I don't know what it is in aluminum.

McConnell. I am sure it is the major part, but it certainly is not all of the cost.

After a brief misunderstanding about who raised or lowered pig prices first, Multer observed that if the 26-cent price covers all costs plus a fair return, then the 23¼-cent export price must reflect a loss. But McConnell said that even 26 cents "is not high enough to reflect adequate profit on our reduction plants." This prompted Yates to ask if Reynolds was therefore operating at a loss. "No," said McConnell, but "to realize a profit in our industry you have to go into fabrication."

Multer then switched the discussion back to hot metal contracts. He wanted to know why the inquiry by the Aluminum Extruders Council failed to get anywhere. "Did you make any inquiries as to whether or not this came from a financially responsible group?" Multer asked.

'Others Were Turned Away'

"I don't think we would have to," replied McConnell. "I don't think — and I don't mean to speak in derogation of Mr. Starr's firm—that they would be in a financial position to take on a molten metal contract. . ."

Multer then revealed that the committee had heard that others had approached Reynolds on the subject and had been turned away. "No question raised about capacity or financial responsibility," he added. "They were just turned away." McConnell assured the Congressman that "we will check that."

Several minor points were then brought up and disposed of quickly. In response to questions, McConnell told the committee that Reynolds did not grant any customers free warehousing ("Not that I know of."); that the company's advertising allowances may vary between classifications of customers, but not within classifications; and that Reynolds has the same credit terms for all customers.

Toward the end, Victor Dalmas tried to find out if there was some pricing formula within the aluminum industry. This, he reasoned, would help the committee judge whether there actually is a price squeeze. McConnell could not offer much help. "The price structure has grown on the basis of the competitive situation as the industry grew," he observed. "I don't know how you could change it at this point."

That concluded McConnell's testimony. The Chairman called the next witness.

TO BE CONTINUED . . .

Part 3 of this special MODERN METALS report will be published in the August issue. It will include testimony of the following witnesses:

M. F. Garwood — Chrysler Corp.
S. E. Skinner — General Motors Corp.
L. P. Favorite — Aluminum Co. of America
J. L. Cameron — Ford Motor Co.
D. A. Rhoades — Kaiser Aluminum & Chemical Corp.

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Welding Aluminum

Part 3: The Metal-Inert-Gas Process

Covered here are the manual and machine methods of metal-inert-gas (MIG) welding. All phases of the process are discussed including equipment needed; operational theory; torch manipulation; technique; possible applications, etc. Next month, the inert gas shielded processes, MIG and TIG, will be compared and contrasted.

Based on information supplied by Aluminium Laboratories Limited, Research Division of Aluminium Limited

METAL-INERT-GAS (MIG) welding is a process which produces X-ray quality welds on aluminum at speeds ranging from 2 to 4 fpm with manual welding and up to 15 fpm with machine welding. High current densities, which result in high heat transfer efficiency, are used.

Two accepted methods form the basis of MIG welding. One is the submerged arc process for steel, which feeds a consumable electrode into the arc from a coil. The other is TIG welding using inert gas as a shielding medium. Coupling the advantages of both processes led to MIG welding. With MIG's high joining rates and low cost per foot of finished weld, aluminum is able to compete favorably with steel and other metals in many applications.

Advantages of aluminum in transportation plus economical MIG welding are expanding the use of aluminum in ship superstructures, dump truck bodies, road and rail bulk transporters, etc. Welded aluminum structures widely used in the chemical industry include storage tanks for acetic acid, hydrogen peroxide and ethylene glycol.

Also on the upswing is the use of MIG-welded aluminum for general structural work. And its advantages coupled with ease of joining by MIG welding make it a logical choice for constructing skips and cages for mines and conveyor systems.

MIG equipment can be used to weld other materials including magnesium (see MM, April, p. 46), mild and stainless steel, copper, and others. To change from one material to another it is usually only necessary to switch filler wire to the requirements of the parent metal. Sometimes the wire drive rolls must also be changed.

Since no flux is required for MIG welding aluminum, costly flux removal and postweld joint corrosion due to flux residue are eliminated.

Another outstanding MIG characteristic is the use of extremely high welding current densities (from 50,000 to 300,000 amperes per square inch). (Normal current densities used with the TIG process are about 10,000 amperes per square inch.) High current densities, plus very efficient heat transfer in the arc, result in high welding speeds, less distortion, lower welding costs, better strength, and better corrosion resistance than obtained with any other aluminum fusion welding process. Also, the process produces deep penetration making it ideal for fillet and lap welds.

All-Position Welding

Speedy welding can be done in any position. This is of extreme importance in many applications where assemblies or sub-assemblies cannot be positioned for welding. Although the TIG process could be used, the difficulty of manipulating the torch in position would require highly skilled operators. This is not the case with MIG; operators of normal ability can learn to produce good welds, in position, in a short time.

Because the process is semiautomatic, operation is less fatiguing than TIG. Thus, it is possible to obtain a high operating factor.

One outstanding disadvantage of the MIG process has been the fragile equipment which requires a good deal of maintenance to keep it in proper working order. New, more rugged equipment is complicated and still requires close attention.

MIG's high welding speed usually keeps distortion below that encountered when steel of the same thickness is welded manually with stick electrodes. Minimizing distortion is important when welding medium and heavy gauges, and vital when joining light gauges. Unfortunately, MIG cannot be used on material lighter than 0.050 inch where its speed and minimum distortion would be of tremendous value.

In the MIG process, electrode material is melted by the arc and deposited to form the weld bead. Since it is not possible to weld without depositing filler material, the process cannot be used where joint design dictates that filler metal be produced by melting down an upturned flange. Nor can it be used for tightly closed butt joints such as those usually employed in making containers and tubing of light gauge material.

Recent developments have made it possible to produce filler wire free from porosity-forming material so that quality welds can be produced in all positions under production conditions.

Because of the deep penetration by the MIG arc and the high current densities employed, this process is particularly suited to welding material ranging from 0.050 inch to 3 inches thick. (Recently developed equipment has extended MIG's lower limit, especially when machine welding, to material as thin as 0.032 inch.) Butt, fillet and lap welds in sheet, plate and extrusions are readily made up to 1 inch thick without preheating. Heavier sections usually require preheating to approximately 400°F.

For machine welding applications, standard manual MIG guns can be used, though special automatic heads are obtainable. MIG's speed with machine welding makes it useful for long welds in flat plate. Although manual

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welding of these joints may involve some distortion, this is greatly reduced by the high speed of welding.

Operation of MIG Process

MIG operates on direct current (d-c) reverse-polarity (electrode positive). When the arc is struck a small diameter bare electrode aluminum wire is automatically fed at constant speed through a manually operated welding gun. The d-c arc is maintained between the wire end and workpiece in an inert gas.

The wire is either pushed or pulled from a reel, through a nylon-lined flexible hose to a contact tube in the gun's barrel. Current is picked up by the wire as it travels through the contact tube which is connected to the power source. When the gun's trigger control is depressed, it closes a welding contactor, opens a gas solenoid valve, and starts the flow of coolant.

Operating on d-c (reverse-polarity) causes metal to be transferred through the arc in small droplets. When 1/16-inch diameter wire is used with a welding current of 85 amperes (current density of 27,000 amperes per square inch) the arc is very unstable and filler is deposited as large, discontinuous globs on the work surface. When current is increased to 160 amperes (40,000 amps per square inch) the arc is stabilized and a uniform bead deposited.

Further improvement is obtained when current density is increased to 60,000-70,000 amperes per square inch. At these high current densities the arc consists of an outer and an inner cone. The inner cone is steady and well defined and metal transfer takes place through it as a spray of fine droplets projected from the electrode's end at a relatively high velocity.

Slight sputtering or disturbance on the parent material around the outer cone is caused by the action of the cathode spot on the oxide surface of the aluminum. This removes oxide and cleans work ahead of the arc prior to deposit of weld metal. The inert gas shield around the molten puddle prevents reoxidation of the puddle until after the weld has been made.

As mentioned, wire feed rate remains constant during welding. This makes it necessary for the arc length to be self-adjusting, so any change in it is compensated for, or corrected, by the properties of the arc and its circuit (see Fig. 1). A fall in burn-off rate due to an increase in arc length results in a return to equilibrium conditions in the arc. The opposite occurs for a decrease in arc length.

Two factors contribute to this. One is the output characteristic of power source since an increase in arc voltage normally results in a decrease in arc current, hence in burn-off rate. The other is inherent properties of arc since burn-off is less for a long arc than for a short arc at the same current. This is said to be due to the electrode tip receiving less radiation from the weld pool at longer arc lengths.

Overall self-adjustment due to the first factor can be greatly enhanced by using a power source in which open circuit voltage is very close to that of operating voltage. The larger the change in welding current for a given change in arc voltage, the greater the self-adjustment and speed of correction (see Fig. 2).

Conventional welding power sources produce virtually constant current conditions because of their steeply drooping output (Curve 1, Fig. 2). The illustration shows that current at a given setting does not vary to any extent with a change in arc voltage. This type of power source is quite satisfactory for manual welding of steel or aluminum with flux-coated electrodes.

It is less suitable, however, for the MIG arc in which a large current change for a change in arc voltage is preferred. With a much flatter output (Curve 2 of Fig. 2) or a rising curve (Curve 3 of Fig. 3) the current change per volt is larger and, theoretically, a more desirable form of output. This implies that the former source has basically a low open circuit voltage which does not differ greatly from the operating arc voltage.

For a low voltage power source with a nearly flat or rising characteristic, remarkable self-adjustment is achieved. This gives a steady arc length during welding, with disturbances rapidly compensated for. The trial and error method of setting operating conditions (encountered with drooping characteristic power sources) is eliminated since there is no need to set current to match wire feed rate.

The operator selects arc length and wire feed rate. When he strikes the arc, the current immediately rises to the value where it consumes wire at the rate required to maintain the preset arc length. If a higher current is needed, the wire feed rate is increased which demands higher current.

Improved power sources also greatly reduce burn-backs, involving fusion of electrode to guide tube of torch, which are often encountered with drooping characteristic power sources.

MIG Equipment Includes . . .

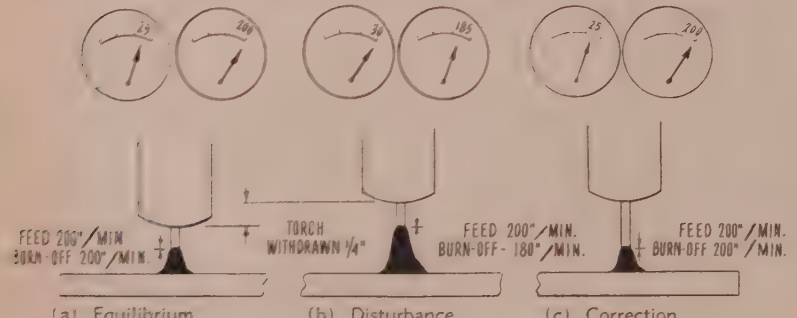
Equipment for manual MIG welding consists of a d-c power source, an electronic control circuit, a wire drive mechanism, and a welding gun. Machine welding requires all of this equipment and, in some cases, an electronic voltage control unit to maintain a constant arc length. A machine welding head is preferred to the manual welding gun. All MIG equipment is reasonably portable.

The d-c power source should be able to deliver current uniformly with minimum fluctuation due to changes in line voltage. Changes in output due to overheating and lack of maintenance should also be negligible. Units should be capable of a high degree of self-adjustment of the arc. This means an automatic change of output to maintain a constant arc length in spite of fluctuations in wire feed speed, poor welding technique, or other factors which lead to mechanical stoppages.

Power sources should be air-cooled with air properly filtered to prevent buildup of dust and dirt on working parts. Units should be mobile, and gas or diesel driven models should be available for welding in locations with no electrical power.

Various d-c power sources used for MIG welding include standard motor-driven generators with a drooping output, selenium oxide rectifiers with similar characteristics, constant potential units with slightly drooping output,

FIG. 1: ARC LENGTH SELF-ADJUSTMENT IN MIG WELDING



■ ***Self-adjustment of arc length is shown above. In equilibrium (a) arc length is ¼-inch, arc voltage 25, arc current 200 amps. As arc length increases to ½ inch (b), voltage goes up to 30 while current drops to 180 amps, reducing burn-off. It is corrected (c) by excess wire feed which reduces arc length and returns welding to equilibrium conditions (a).***

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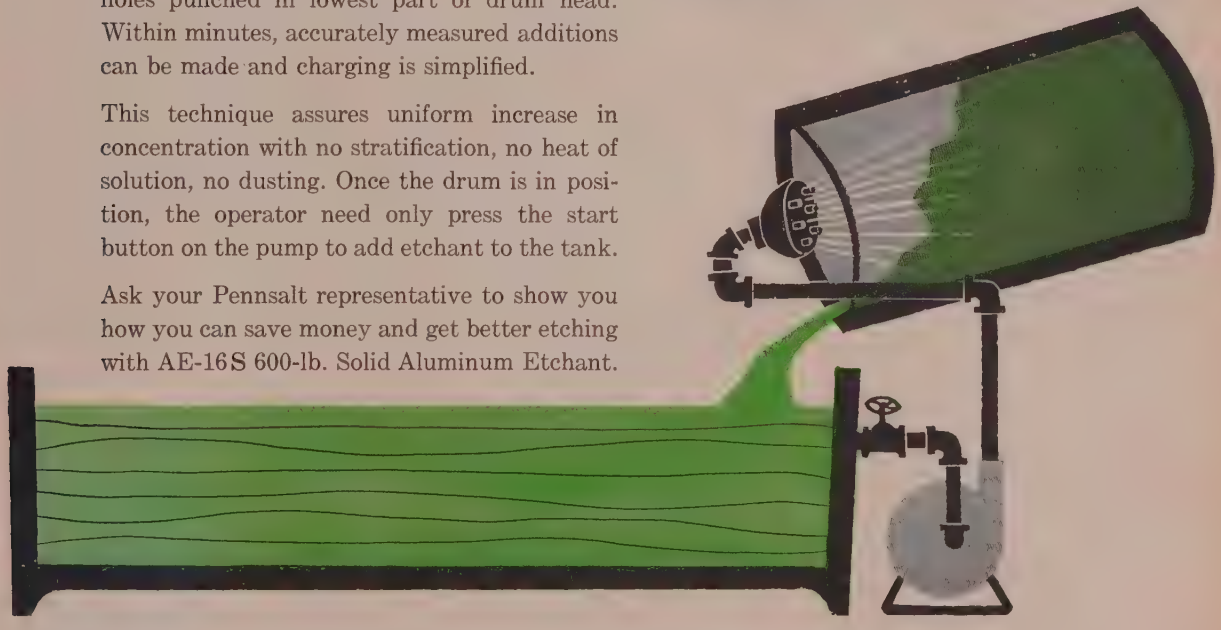

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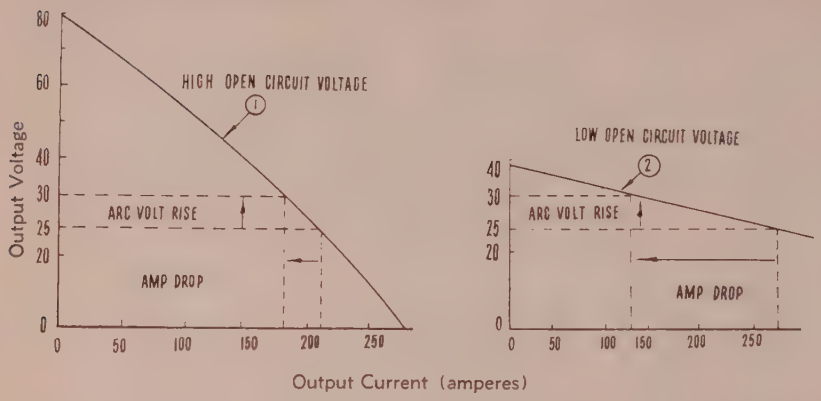
FIG. 2: OUTPUT CHARACTERISTICS OF CONVENTIONAL AND CONSTANT POTENTIAL TYPE POWER SOURCES



and constant potential units with rising output characteristics.

Constant potential units having slightly drooping or rising characteristics are preferred because of their ability to alter automatically their output current to compensate for increases or decreases in wire feed rate and maintain a constant arc length. This automatic self-adjustment greatly reduces work stoppages due to burn-backs.

To set a constant potential unit the operator merely selects the voltage required and establishes the arc while the unit delivers the correct current to burn off the wire at the present arc length. More or less welding current is obtained by altering the feed rate of welding wire.

Rectifiers are still used for MIG welding and will continue to be used until fully depreciated.

Electronic control circuits must be capable of starting and stopping wire feed, gas and coolant flow, and welding current within the time cycle required for operation of the welding equipment. This is done via a trigger in the handle of the manual welding gun. For machine welding a switch should be located close to the welding head.

Type of circuit used depends on whether the filler wire is to be fed for a scratch or a running start. For a scratch start, when the trigger is depressed shielding gas and coolant valves are opened and the primary contactor is pulled in. When wire is scratched on the work, the arc is established and wire feed starts.

To stop welding the trigger is either released or re-depressed, shutting off gas and coolant and breaking the circuit at the primary contactor. Once the arc is broken the wire drive stops.

For a running start the control trigger is depressed and the shielding gas and coolant start to flow. On releasing the trigger, the primary contactor is pulled in and the wire drive unit goes into action. As soon as the wire contacts the work the arc is established. It may be broken by re-depressing the trigger which, in addition to interrupting the welding circuit, stops filler and gas and circulation of coolant.

Machine welding circuits should be capable of producing either a scratch or a running start, as used for manual welding, or a delayed start. In the latter it may be necessary, for full penetration at the beginning of the weld, to delay feeding of wire briefly after the arc is established. Control circuits of this type should permit variation of the delay time according to joint requirements.

Both manual and machine welding equipment should be supplied with an "inching" or "jogging" circuit to allow filler wire to move through the equipment without first establishing an arc.

The wire drive mechanism must be able to propel the welding wire to the arc at a constant rate with a minimum of marking, scratching, or flattening. To maintain a uniform rate the output of the wire drive motor should not be influenced by changes in line voltage, variations in temperature, or sustained periods of operation. The motor should reach its required speed quickly once the arc is struck, and stop abruptly when the arc is broken.

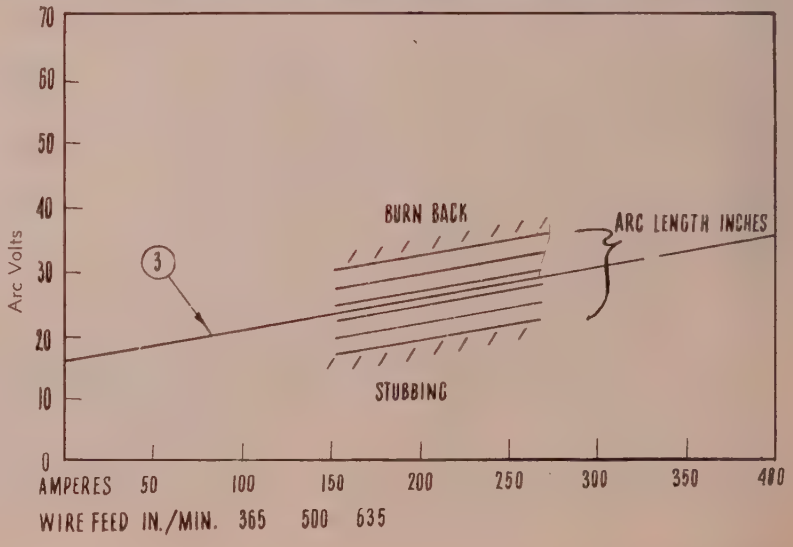
The drive roll motor control may be on the motor itself or remotely located. Motor speeds should be uniform throughout the range of control settings. At the very low and very high settings this may be difficult. If so, a number of gears with varying ratios should be supplied so the motor can operate in the range which produces the most uniform feed.

Knurled or serrated drive rolls are not recommended for use in aluminum since they chip off small particles of metal which fill up the wire passage and cause stoppages. For uniform wire feed both rolls should be driven. They should also be grooved to a 60° included angle. Width of groove will vary with diameter of wire being driven. Less uniform wire driving can be achieved by grooving and driving only one roll with the second left flat to act as an idler.

The wire drive mechanism may be located on the drive unit or in the welding gun. When rolls are located in the gun and wire is pulled through, smaller diameter wire can be used. This makes it possible to weld lighter gauge material than when the wire is pushed through the flexible tube.

The welding gun should be rugged enough for production welding, yet light and well balanced to minimize operator fatigue. It should be able to be taken apart and reassembled quickly without producing air or water leaks. Easy manipulation of trigger and inch-

FIG. 3: OUTPUT CHARACTERISTICS OF POWER SOURCE WITH RISING VOLT AMPERE CURVE



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ing button with a gloved finger is vital.

The gun should be designed so a coolant can circulate through the gas cup and body to dissipate radiated heat, and so the path the inert gas follows to the weld puddle is not interrupted. Contact tubes should be short, with minimum clearance between welding wire and wire passageway. The tube's end should be swaged to insure current pickup at this point.

Avoid Wire Metal Contact

Except in the contact tube and drive rolls, the welding wire should not come in contact with any metal surface while passing from its spool to the arc. The flexible, inlet and outlet guides of the wire drive unit, and wire straightener (if needed), should have nylon liners. Clearance between liners and wire, when it is pushed through the flexible, should be great enough to prevent undue friction and small enough to prevent the wire from buckling or slacking, which produces uneven wire feed. Liner clearance for units which pull wire through flexible is not as critical.

Units which push wire become erratic as the length of the flexible increases. For this reason the distance from the wire drive roll to the welding gun should be as short as possible.

When installing electrical equipment for MIG welding, the input of power sources, especially those having drooping characteristics, should not be placed on the same line with other equipment having high power demands.

Electrode wire for MIG welding is supplied level wound on spools which fit all makes of equipment. Electrode wire is available in 1100, 4043, 5254 and 5356 alloys. Other alloys for special applications are obtainable, subject to special inquiry. Electrode wire comes in various sizes. Consult your welding distributor for the proper diameter wire for your particular job.

Keep Wire Clean!

Wire cleanliness is vital. Special precautions are taken during production, and the wire should be "shaved" during fabrication to remove all oil or dirt. In order to maintain cleanliness wire is supplied in sealed packages which should be stored in a clean, dry atmosphere with uniform temperatures (65°-80°F). The package should be kept sealed until used, and then the mounted coil should be covered.

MIG welding wire must also be level wound on the spools. Otherwise, one layer of wire may become entangled with the next, which usually stops feeding or slows it down to the point where a costly stoppage (burn-back) is encountered. Wire should be checked so that there are no kinks, bends or scratches on it to impede its even flow.

Most of the inert gases (argon, krypton, neon, xenon, helium) are suitable for the MIG process, but argon and helium, being the least costly, are the only ones used. Argon is used almost exclusively in all countries but the U. S. Helium is less expensive, volume for volume, than argon, but has a lower density and therefore requires more volume to produce the necessary shield. As a result, gas cost per foot of finished weld using either argon or helium is approximately the same.

Helium has a high ionization potential which causes it to penetrate deeply into the root of lap and fillet joints. But helium makes the arc erratic and causes dirty welds. Argon does not have these disadvantages and is usually preferred for welding aluminum. However, helium may have to be used, alone or mixed with argon, to produce adequate weld penetration when joining very heavy material. When a mixture is required (60% argon, 40% helium) care must be taken to insure proper mixing of gases.

Artificial Cooling Needed

Because of MIG's high current densities it is necessary to artificially cool the welding gun to prevent damage to the gas cup and other parts close to the arc. Cooling is achieved by water circulating through the gun. Water comes from a main supply and is discharged into a drain.

In some cases, especially where portability is important, the two extra leads needed for this may be undesirable. If so, a system consisting of an eight-gallon storage tank and a circulating pump can be used. Coolant can be water, soluble oil or antifreeze if welding is to be done at below freezing.

Pre-weld considerations are the same for MIG welding as for other methods. These include type of joint, edge preparation, surface and joint cleaning, joint spacing, jigging, pre-heating and selection of machine settings for various types of joints. Specific recommendations on pre-welding operations for each job can be had from the major metal and equipment suppliers.

Selection of filler alloys is usually governed by the metal to be joined. The same filler is used for both TIG and MIG welding. Recommended filler alloys for the processes, and various common parent metal combinations, are listed in Table I of "Part 2: The TIG Process" (MM, June, p. 52).

Only one hand is needed to operate the MIG welding gun, so technique varies considerably from that used with TIG. Since the weldor does not have to coordinate both hands, training time and operator fatigue are lessened.

The weldor should be as comfortable as possible before starting to weld. It is not necessary to position the weldment so all welding can be done in the flat position. In fact, it is usually less fatiguing to weld in the vertical, horizontal or overhead positions.

It is essential that the operator have enough freedom to move at least his torch arm. When welding in position, the feet and body should be braced to minimize body sway. The flexible of the welding gun should be kept as straight as possible during welding. This can be aided by swivel mounting the wire drive unit on an overhead gantry or boom.

Clear View Necessary

The weldor should always have a clear view of arc, weld puddle, and unwelded portion of joint. Torch angle, arc length and body positions should be adjusted to allow for this. To aid the weldor's view, a helmet should be fitted with a 4 by 5 inch welding filter.

Welding current required will depend upon work-piece thickness, welding position, size of weldment, and type of joint. Generally, more current is used for flat welding than for position welding, and fillet and lap welding require more than butt welding.

Current should be sufficient to produce a fine spray transfer of filler wire through the arc. If too low an amperage is employed, globular transfer results, because the filler wire passes through the arc in unstable droplets.

An operator can tell if the proper current is being used by fracture testing a weld made on a piece of scrap material. If the joint is completely penetrated with complete fusion at the root, welding current is correct. If not completely penetrated, welding current is too low; if penetration is excessive and weld is wide, current is too high.

Before welding, the weldor must balance the speed at which wire is fed to the arc against the welding current required to produce the weld. To do this the wire feed speed is varied until a satisfactory arc length is established. A constant potential power source does this balancing automatically. However, some adjustment of arc voltage is required each time current is altered.

Striking the Arc

In striking the arc, the welding gun is held in either hand with the index finger ready to operate the trigger. The gun is brought to within 1 inch of the work before the trigger is pressed. The arc is struck using either a scratch or a running start.

Welding is done from right to left for a right-handed operator, from left to right for a left-handed operator. For butt welding, the torch is angled from 10° to 15° to produce a forehand torch

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angle (see MM, "The TIG Process," Fig. 6, June, p. 56).

Torch angle is very important. It affects welding of the joint, depth of penetration, bead contour and undercutting. It may have to be altered slightly, depending upon arc travel speed, position of joint, size of weld required and welding current.

If welding at speeds higher than 36 ipm, a torch angle greater than 10° to 15° is recommended. Vertical welding is done in the upward direction with a leading torch angle of from 10° to 15°. When a weld is to be made between dissimilar thicknesses the torch should be directed toward the heavier member.

Manipulating the Torch

For fillet and lap welding, the torch bisects the 90° angle made by the joint and a forehand torch angle of from 10° to 15° in the direction of travel is used. For position welding of laps and fillets approximately the same torch angle is used as for flat welding.

When the arc is started, the end of the gas cup should be approximately 1 inch from the work. Arc length should be from 3/16 inch to 5/16 inch long for material thicker than 3/16 inch, and from 3/32 inch to 1/8 inch long for material thinner than 3/16 inch.

A short arc is usually used for the first pass in multipass welding and for getting into the root of groove welds. A short arc is also used for small fillets. A longer arc is used for the finishing pass of multipass welding where a wide, shallow weld is required.

When welding with 5056 filler alloy the gas cup is usually held less than 1 inch from the work. The better shielding produced by this technique minimizes or eliminates the black sooty deposit along the edge of the weld which results with the longer cup-to-work distance.

It is necessary for the weldor to maintain the arc length within the limits mentioned. If the arc is too long it has a tendency to melt plate edges without producing fusion at the root of the weld. Too long an arc may also produce voids, unless welding with abnormally low current and arc travel speeds.

If too short an arc is used, it becomes quite noisy and produces spatter and smoke. Also, a good deal of weld porosity may be encountered.

Joints should be properly aligned before welding. This can be done with jigs or by tacking. Long shallow tacks rather than short heavy ones are recommended since shallow tacks can be welded over with complete penetration at the tack's start and finish. Tacks must be deep enough, however, so they will not crack during welding.

After the joint has been aligned the arc should be struck approximately 1/2 to 1 inch in from the end of the joint and then moved quickly back to its start. This produces a slight preheat and helps eliminate porosity and cold starts at the beginning of a weld.

For fillet welding, after striking the arc, the torch is moved along the joint with a slight circular motion at about four to five complete turns per second. Total lateral movement of the torch agitates the puddle and eliminates porosity on fillets larger than 3/16 inch. For small fillet welds the circular movement is not needed.

The technique used for butt welding is somewhat similar, but the circular motion is not recommended, especially for butt welds made in position. String beads are usually made so as much metal as can be controlled without sagging or undercutting is deposited in one pass.

If undercutting is encountered on vertical and horizontal butt welds, it will be minimized by a slight reduction in current for the finishing pass.

For overhead butt welds where more than one pass is required, the torch should be held at a 90° angle to the work, without a leading torch angle, using a short arc (3/16 inch). This gives the weldor a clear view of the weld area and enables the first pass to be completed easily. In subsequent passes the arc is lengthened to 5/16 inch and normal technique is used.

For butt welding in any position it is necessary to use a backing strip to prevent the forceful MIG arc from blowing through the joint. Backing strips are usually aluminum, but steel or stainless steel and, in certain cases, copper can be used.

■ ***Weldor is using the manual metal-inert-gas (MIG) welding method to join an extrusion to 1/4-inch plate. Aluminum alloy 5083 is being welded using a 5356 electrode wire.***

Backing strips may be temporary or permanent. Temporary backing strips are chipped off after welding. It is not necessary to have a butt weld fused completely to the temporary backing, as long as the reverse side of the joint is back-chipped to sound metal after strip removal. With permanent backing strips it is necessary to fuse the two edges of the joint to the strip. This is achieved by using a larger root opening than with a temporary strip. Permanent strips should always be aluminum.

Arc travel speed depends on the size of the weld, amount of current used, thickness of material, joint alignment, torch angle and arc length. If too short an arc or too little torch angle is used melting of the joint will not take place quickly enough to permit high speed welding.

The size of the weld can be controlled by the arc travel speed. If a small weld is required then arc travel speed can be reduced with no alteration of welding current. This, however, applies only to welding in the flat position, since it is necessary to reduce the welding current slightly in order to prevent undercutting when welding in position.

Open-Air Welding

When MIG welding out-of-doors it is usually necessary to reduce cup-to-work distance to prevent wind from disturbing the inert-gas shield. In addition, gas flow may have to be increased. Wind breaks can be erected to cut the effect of the wind on the gas shield.

Many factors influence the quality of MIG welds. Faulty electrical equipment, faulty or poorly adjusted wire feed mechanisms, faulty welding guns or flexibles, low quality welding wire or shielding gas, poorly trained operators, inadequate supervision, inadequate preparation and process limitations all have their effects.

While most d-c power sources may be used for MIG welding, least difficulties are encountered with those having an open circuit voltage near that of the operating voltage of the arc. This enables a high degree of self-regulation of arc length to be maintained, and results in few mechanical stoppages.

Power sources with a high open circuit voltage have little or no self-regulation of arc length. This causes an uneven wire burnoff rate that allows frequent fusing of aluminum filler wire with the gun's copper contact tube. When this occurs the contact tube must be replaced.

Hunting (variations in wire feed rate) which causes the arc length to fluctuate, usually results in localized areas of weld

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porosity. When the arc lengthens and approaches the point where a burn-back may occur, it is difficult to maintain penetration, especially on groove welds, since the arc has a tendency to hit the side of the groove rather than the root.

The faults mentioned cannot always be attributed to the d-c power source, but units which do not produce a self-regulating arc undoubtedly contribute to these difficulties.

MIG welding units in which the wire drive power source is susceptible to changes in input also contribute to the amount of hunting encountered when welding with other than constant potential power sources. If the speed of the wire drive motor is not constant through its entire range of operation, and if it has to be operated within its nonuniform range, sporadic wire feed with consequent areas of porosity and lack of penetration will result.

Watch Drive-Roll Pressure!

Nonuniform wire driving may also be caused by improper pressure on the wire drive rolls. If there is not sufficient tension on the rolls, the wire may slip, momentarily slowing wire feed. If too much pressure is applied, the wire may be marked or flattened, which also produces nonuniform wire feed.

A number of weld defects may be directly traced to faulty welding guns. Weld spatter adhering to the end of the guide or contact tube may temporarily slow or stop wire feed.

Contact tubes with a wire passage too large for the diameter of wire being used may cause arcing between the guide tube and the wire. This makes it impossible for the wire to feed uniformly. Worn nylon liners or inlet and outlet guides may also contribute to nonuniform wire feed.

An erratic arc and dirty weld bead are the most serious defects attributable to faulty guns or accessories. Loose gas connections or faulty water seals in the gun will allow water or air to be driven into the argon shield and cause oxidation of weld puddle.

Contact tubes, especially in machine welding, that are not centered in the gas cup may cause a swirling of the shield. This allows air to mix with the gas as it leaves the cup, and causes an unmanageable arc and a dirty weld.

If the nylon liner in the flexible becomes worn and does not properly support the filler along its entire length, the wire will slack. This slackness may cause wire feed to vary because of variations in friction between the wire and the nylon, as the bend in the flexible is changed during welding. So, be sure the proper nylon liner is used for the size of welding wire employed, and that worn liners are replaced.

Current production techniques have virtually eliminated the possibility of weld defects due to dirty filler wire. However, porosity may still be encountered if wire is not stored and handled so cleanliness is maintained. Other defects, such as burn-backs and lack of penetration are encountered if wire is improperly wound or contains snags, kinks, or scratches.

When wire is level wound it takes a permanent set because of the small hub diameter of the spool. Therefore, a wire straightener is needed. The amount of straightening required will vary with the alloy. Alloys 1100 and 4043 operate best when all of the set is removed.

However, because of the higher surface resistance of 5356, it should have a small amount of set left so sufficient friction is obtained to produce adequate electrical contact in the copper contact tube. If this is not done, arcing between wire and tube may be encountered.

With the high purity of the shielding gas being produced today, and the great care taken by the gas suppliers to maintain this purity, it is virtually impossible to get a cylinder of gas which falls below the commercial purity limits of 99.8%. Therefore, the gas is usually not a cause of poor weld quality.

Numerous weld defects can be caused by faulty welding techniques. It is therefore essential that welding operators be given sufficient training to be sure of their ability to produce welds which meet the required standard.

Supervision Important

Adequate supervision is also vital to consistent production of high quality welds. This not only includes supervision of the welding operation, but also covers edge preparation, fitup and finishing operations. Common defects resulting from poor supervision are: Failure to follow instructions indicated on drawings; inadequate edge preparation; incorrect joint fitup; incorrect joint spacing; improper welding sequences. If any of these occur speeds will be slower than expected, which will reduce joint efficiency and raise costs.

Many weld faults can be traced to lack of planning and preparation. The burden of proper planning lies with the supervisory staff who should be sure that proper equipment and welding materials are available for each job.

Preparation of work pieces also demands close attention. Weld faults such as porosity, lack of fusion and low durability can be attributed to oil, grease or other dirt on joints. Incorrect edge preparation, too little or too great joint spacing usually leads to incomplete fusion, lack of penetration, too wide a weld, weld overlapping and poor weld starts. Misalignment of the joint edges usually makes it impossible to weld.

Edge preparation and, in some cases, fitup, may be done outside the welding shop, and by other than welding personnel. The welding staff should nevertheless follow the material through its various preparatory stages, so errors which may lead to low quality welds can be reduced.

As pointed out earlier, the MIG process has certain limitations which will preclude its use in the production of certain welds. These limitations should be well known so the process will not be used on jobs where it will be unable to make a satisfactory weld.

The MIG process is not recommended for the manual welding of material less than 0.050 inch in thickness. If machine welding is to be used, this thickness can be reduced somewhat. Also, certain joints — upstanding edge joints, corner joints — are not recommended for MIG welding. The size of the wire drive unit, which may prevent it being taken through small openings, such as manholes in tanks, may limit its use.

Following are some other difficulties encountered in MIG welding.

Poor arc starting can be caused by improper grounding, improper adjustment of control circuit or lack of shielding gas. To correct, check welding leads and control circuit setting, and be sure there is shielding gas.

Unstable arc can be the result of arc blow. To prevent this do not weld in area of strong magnetic field, or arrange ground clamp(s) to neutralize the magnetic field. Sometimes too much helium in the shielding gas can cause an unstable arc. If this is so, add more argon to reduce the helium concentration. Other sources of trouble can be poor electrical connections, faulty welding technique, dirt in joint area.

Undercutting of welds can come from using too high a welding current, too slow arc travel, or improper gun angle.

Welds will crack if an improper filler alloy is being used. Check Table I, "The Tungsten-Inert-Gas Process," (Modern Metals, June, p. 53) for proper filler alloy. Cracking can also result from inadequate edge preparation or joint spacing, incorrect technique, or low arc travel speed.

Welding cables will overheat if they are too small, or loosely connected.

Overheating of drive motor results if wrong gear ratio exists in wire drive unit, or if gears are misaligned.

Overheating of power source comes from too high a duty cycle or insufficient cooling.

Incomplete fusion can be caused by dirty joints, too long an arc, or inadequate joint spacing or edge preparation. To prevent this, degrease or wire brush joint area, shorten arc lengths to ¼ inch, check edge preparation.

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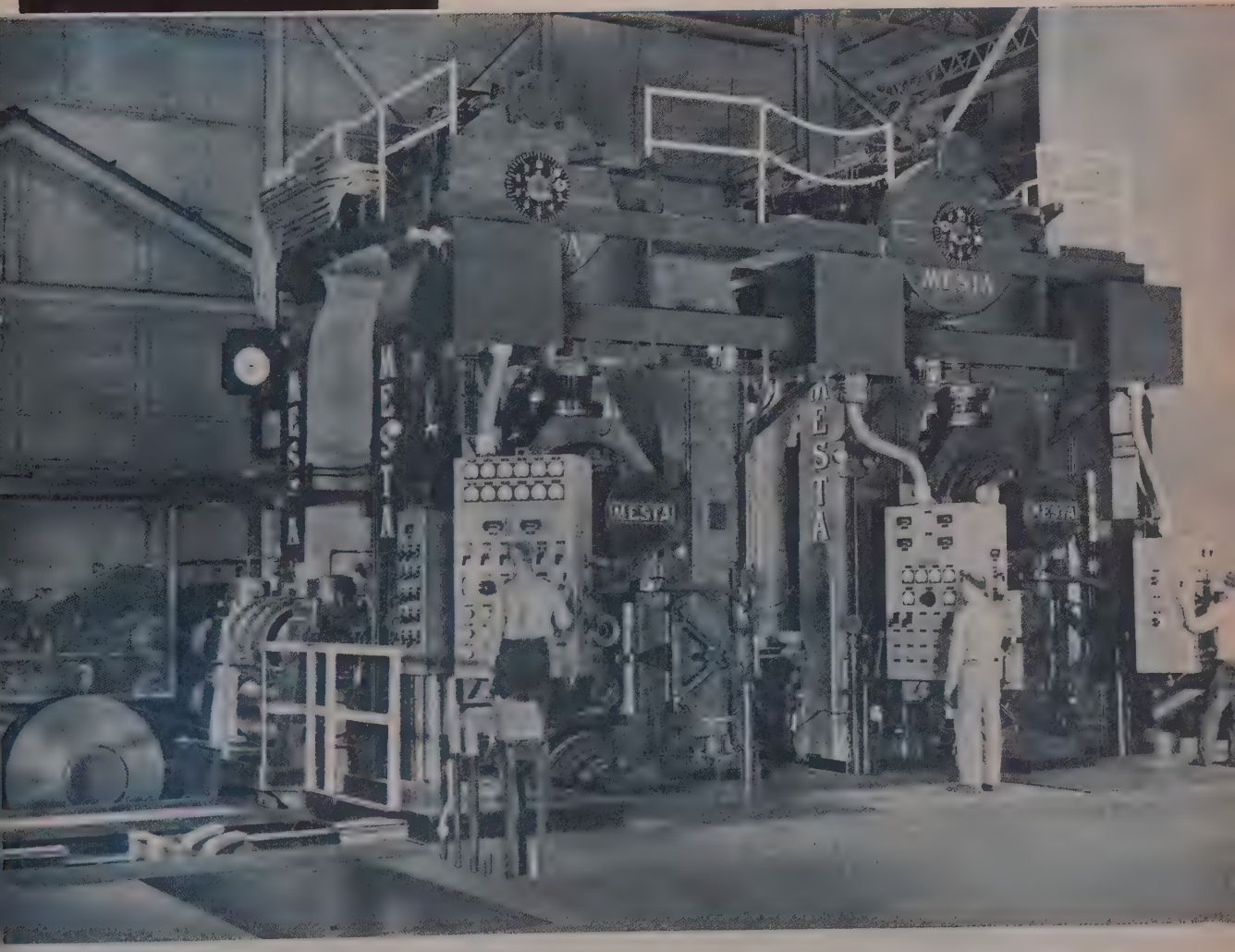

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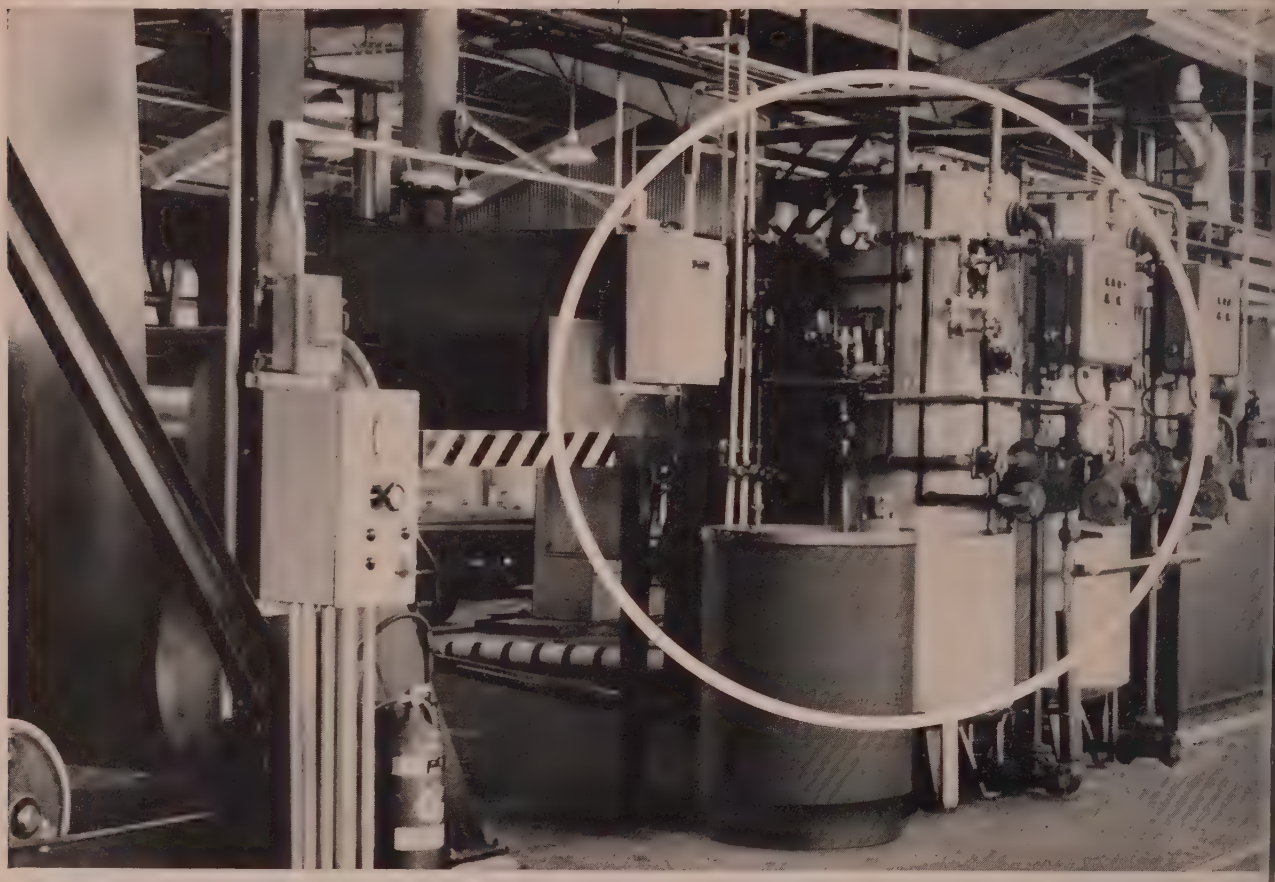

This quality control center solves a serious production problem — the build-up of contaminating reaction products in the processing solution on high production strip lines for conversion coatings on aluminum.

It eliminates the formation of sludge and the need to dump the coating bath, ever.

It results in:

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How Parker Reactifier maintains quality

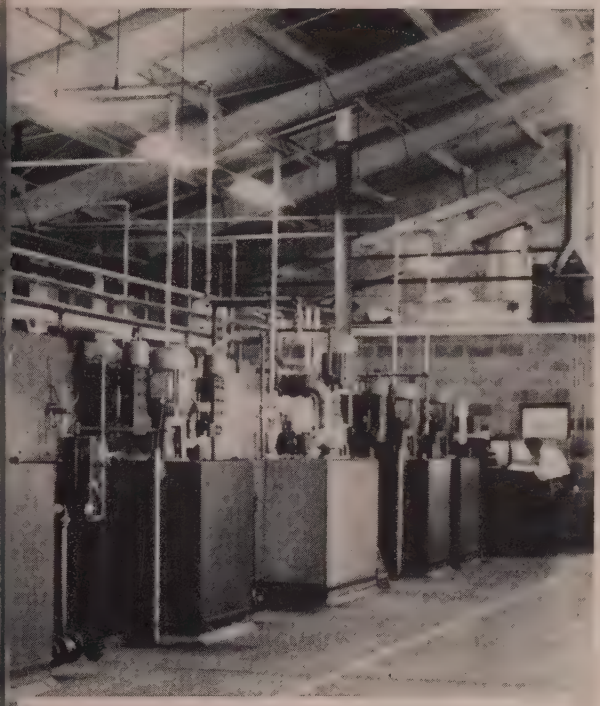
As aluminum is treated in any conversion coating solution, there's a build-up of reaction products, mainly aluminum and trivalent chromium, in the bath. Continued operation without removal of these impurities means slower coating action, sludge formation, and irregular and inferior coatings.

The control or removal of the interfering impurities stymied manufacturers for years until Parker developed the Parker Reactifier for use with Bonderite in high production aluminum lines.

The Parker Reactifier is an ion exchange unit connected in the circulation system of the processing solution. As Bonderite flows down through the cation resin bed in the Reactifier, aluminum and chromium are removed and the purified Bonderite is re-

CONTROL CENTER

on high production aluminum strip lines



This Bonderite installation at Kaiser Aluminum's Ravenswood Works, Ravenswood, West Virginia, handles aluminum strip up to 66 inches wide. Tandem Parker Reactifiers remove contaminants from the Bonderite solution as they are formed, keeping coating quality at a constant high level.

The Parker Reactifier, "Quality Control Center" of Bonderite for aluminum on high production strip lines. Bonderite enters at "A"; resin "B" removes impurities by cation exchange action; purified solution is returned at "C." Regeneration of the unit is accomplished by circulation of acid from tank "D" to cleanse resin of accumulated impurities.

turned to maintain the coating bath at top efficiency.

Proven by years of use

One Parker Reactifier has been in continuous use for over three years on a Bonderite high production aluminum strip line. In all that time there has been no deterioration of the cation resin, no sludge build-up, and no reason to discard the bath. This manufacturer now is installing a second strip line for Bonderizing aluminum with another Parker Reactifier for quality control.

In the comparatively short time Parker Reactifiers have been available, the largest manufacturing and fabricating plants have installed 30 of them to assure high quality coatings on aluminum.

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HOW ALUMINUM WILL SERVE the RAILROAD REVOLUTION

Since mergers and car-leasing pools are primarily economy measures, railroad and car pool management should welcome what aluminum has to offer. If the roads are revolution minded, a willing tool is ready to hand — 150,000 tons worth.

By H. K. Darby, Associate Editor

THE SOUTHERN Railway's history-making order for 1205 aluminum freight cars has long been filled, but a sense of achievement still glows at Reynolds Metals Co., supplier of the metal. Suppliers to the railroad market grudgingly admit that Reynolds scored an unprecedented breakthrough (it was the biggest car order U. S. railroading has ever seen).

Under this stimulus, all aluminum producers are going all out to exploit the breach. The result is a concerted effort that is putting aluminum into freight cars at an accelerating rate.

Such activity is timely. Railroads are exploring highly economical car leasing arrangements, something they should have done long ago. Mergers are in the air. Only recently the Nickel Plate Road and the Norfolk & Western Railroad agreed to merge, while the New York Central is trying to buy its way into the merger proposal made to the B & O by the Chesapeake & Ohio. Seven other rail mergers are in various stages of development and others doubtless will come in the months ahead.

These long overdue developments will create bigger customers for aluminum, customers who will be more favorably disposed toward the light metal, and in a better position to command lower aluminum prices.

The order books of the primary producers are far from glutted with railroad business, but years of missionary work to overcome the industry's early sins (misapplied alloys, for the most part) and carry the message of aluminum's present versatility and strength are starting to win important converts and worthwhile applications.

The effort is not without its obstacles. Aside from some railroaders' unpleasant experience with the light metal in the past, there is steel's performance and broad acceptance ever since the railroad business began. The staggering maintenance bill generated by steel seems to be taken as a matter of course.

Most purchasing departments seem firmly committed to rock-bottom price buying. Then there's the practice of reciprocity, in which the steel companies have a tremendous advantage. Not many customers of the railroads are bigger than Big Steel, and Big Steel doesn't hesitate to remind the railroads of this.

But the aluminum industry's sales effort is unflagging because this huge market promises incalculable rewards. The American railroads are tremendous spenders. The Eastern Railroad Presidents Conference reports that in 1959 Class I roads spent $818 million for additions and improvements, including $567,546,000 for equipment — meaning locomotives and cars of all types.

Maintenance—Staggering!

With passenger traffic off sharply, railroads bought only 74 cars last year (for line haul, not rapid transit service). But they bought 41,413 freight cars of all types, costing possibly $60 million, and paid out about $1.8 *billion* for equipment maintenance, some $500 million of which could have gone into freight car repairs.

While the all-aluminum-bodied freight car offers a tremendous challenge to the

■ *A giant gondola is shown on its side for flat position welding (left) at the Pullman-Standard plant. Aluminum was a new experience for the weldors here. Other Pullman plants cooperated. At right, workers are guiding huge gondola floor piece toward jig in advance of welding. Suction discs holding the big plate are barely discernible.*

■ *Magor Car Co. weldors finishing up fabrication of pockets before side sheets are added to big four-hopper cars. Aluminum order was for 9350 tons of sheet, plate and extrusions and represented one of the biggest aluminum welding jobs ever handled.*

aluminum industry, these maintenance figures provide a clue to more immediate sales opportunities — the replacement of rusted-out components of existing steel cars, as well as the sale of these components for installation on new cars that are basically steel. Alcoa, Kaiser, Reynolds and perhaps Olin are pursuing these markets assiduously.

Upwards of two million freight cars of all types are riding the rails or standing on sidings in the U. S. today. More than 89,000 freight cars were retired last year, while the average annual retirement over the past five years has been 63,322 cars. Aluminum could help reduce this attrition.

The cost of maintaining a freight car averages about $300 a year. One western road, however, reports that the unit cost of maintaining its 10 aluminum box cars, all 15 years old, averages out to only $218 a year.

There were 724,955 general and special box cars on the job in the U. S. in 1959. To equip only 10% of these units with aluminum doors would require 21,748 tons of the metal using an average of 600 pounds per carset. Aluminum roofs would call for some 34,435 tons, based on an average 950 pounds per roof. Addition of linings of interlocking extrusions to a height of six feet up the car walls would represent, at 1961 pounds per car, 71,082 tons.

These are the choice applications, but there are many others: Journal box bearings and lids for all types of cars, box car running boards, brake steps, and loader beams or separators. Covered hopper cars suggest running boards, hatch covers, platforms, outlet gates and pneumatic unloading systems. Refrigerator cars contain many choice replacement applications. The total market, initially, could be in the neighborhood of 150,000 tons.

Aluminum has a dual mission in freight cars: Reducing maintenance costs and prolonging car life by reason of its corrosion resistance; and reducing operating costs and increasing the payload by lowering tare weight.

These were the factors which, after long investigation, prompted The Southern Railway System to adopt aluminum for 750 gondola cars and 455 covered hopper cars. The gondolas, destined for on-line pick-up and delivery of coal, were built by Pullman Corp.'s Pullman-Standard Division at Bessemer, Ala. The hopper cars were built by the Magor Car Corp., Clifton, N. J., for on-line transport of grain, feed, alumina and chemicals.

The order was for 9350 tons of aluminum sheet, plate and extrusions — the largest aluminum order ever sold for a railroad application, and greater than total U. S. railroad aluminum consumption in 1956.

Taking two hopper cars of the same cubic capacity— one aluminum and one steel — the aluminum car cost, depending upon size 30 to 39% more than the steel car. However, the aluminum car gains five to ten tons in freight capacity, depending upon the density of the lading. Other pluses for aluminum: Lower maintenance, lower deadheading costs and lower handling charges (fewer cars needed to move a given tonnage). The Southern expects that these advantages will pay for the cars in five years.

The hopper cars are made in three sizes: 75 are 4-hopper models, reportedly the world's largest, having a unit

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■ *Broadside view of four-pocket covered hopper car, biggest of its type in the world.*

capacity of 4713 cubic feet; 180 are triple hoppers, 3818 cubic feet each; 200 are two-hopper, 2600 cubic feet.

The smallest model is five tons lighter than a comparable car made of low-alloy, high tensile steel, and nine tons lighter than a car made of open hearth steel. Weight savings in the larger sizes are proportionate.

Fabricating The Cars

The cars are made of 5083-H113 alloy plate and sheet from 3/16 inch thick for roof sheets to ½-inch for side and slope sheets. Because of the severe bending required, inside sheets were supplied in the O temper.

Extrusions are 5083-H112. Casting alloy used was 356. The car builders used some 68,000 pounds of 5356 welding wire conforming to Spec MIL-16053-E.

Prior to welding formed parts, all oil, grease and oxide were removed with a hot dip treatment using Oakite 33 detergent-deoxidizer, at a temperature of 160°F. Smaller parts were stacked and immersed in the big tank for five minutes, then cold rinsed. Large parts were hand brushed with the Oakite 33, then soaked and rinsed.

Cleaned parts were jigged, then tack welded prior to seam welding by the inert gas-shielded metal-arc (MIG) process. Production was speeded by the one-piece side sheets which eliminated many costly butt welds. This was important in the big four-hopper cars which are close to 59 feet long and over 10 feet wide.

Wherever possible, automatic welding was used, according to Ernst J. de Ridder, director of engineering development of Reynolds' Product Development Division. Welding speed on straight seams was 48 ipm.

Using 8000 man-hours a day and one of the largest assembly line operations ever devised for structural aluminum, Pullman-Standard produced the 750 100-ton gondolas in record time. It was the Bessemer plant's first experience with aluminum, so other Pullman-Standard plants helped familiarize 200 welders with aluminum.

Inside dimensions of the cars are 47 feet, 8 inches long, 9 feet, 7 inches wide and 8 feet from floor to top of side top angle. Each car weighs 47,300 pounds, compared to the 63,000 pound weight of a steel car of the same size.

Design follows that of steel cars closely, except for one-piece floor and side construction. Big hollow extrusions serve as cross braces and knee braces. The solid bottom cars will have to be emptied by car dumpers, which suggests that The Southern has very definite ideas as to on-line employment.

Pullman-Standard used manual welding guns made by Linde and Airco, but built up its own 36 automatic machines from various proprietary components. One ingenious device was the 13-head jig which simultaneously joined extruded shapes to plate for gondola car ends.

Bolsters Beefed Up

The aluminum bolsters are patterned after their steel counterparts and are beefed up to withstand the severest loads. Top flange is ½-inch plate, 10 feet long (car beam) by 28 inches wide. Two vertical webs of ⅝-inch thick plate are flame cut to the contour of the press-formed bottom flange which is ¾-inch thick and 22 inches wide.

These parts were welded. Bolsters were joined to the steel center sill by ¾-inch and ⅞-inch hot driven steel rivets.

"A pressing deadline for delivery of the 1205 cars necessitated use of steel center sills," de Ridder said. "Future aluminum cars can be designed with aluminum center sills."

Aluminum and steel faying surfaces were primed with lead-free zinc chromate primer which meets spec MIL-P-8385A. A non-skinning, semiplastic caulking compound was used which remains effective in temperatures between −50° and +200°F. without shrinking, sagging or otherwise losing its ability to protect.

"This sealant also has to resist oxidation, polymerization, or other long-term degradation," de Ridder said. "A butyl rubber base sealant such as Tremco JS 760-2A-15 or Tremco light brushing consistency JS 760 has proven satisfactory. For the undercoat, a material has been suggested which is equal to 3M's product, EC 1189."

The Southern's use of the aluminum for covered hopper and gondola cars follows a pattern which the aluminum producers expect will hold for several years: The most rewarding applications will be for captive cars that complete a carrying job without leaving the road's own system. Thus, the owner derives the greatest benefit from aluminum's low maintenance and light weight.

A captive freight operation often suggests the transport of some bulk material. One exception is the refrigerator car, which carries perishable food and travels most of the time over many systems while still held captive. But gondolas, tank cars and hopper cars — the bulk handlers — are the captive cars and, therefore, choice targets for aluminum sales.

Another Captive . . .

Another exception is one type of captive box car. This is the express service car, often seen in a string of baggage cars at the head end of a passenger train. Several roads have small aluminum cars for express use. The Rock Island, C & O and The Nickel Plate have 10 each. Such cars don't stray off the home system very often or for very long.

According to Alcoa, The Nickel Plate Road built their cars in their own shops in 1948, using equipment usually used for steel fabrication. An inspection last year found the cars to be in excellent condition, capable of lasting 30 years or more.

But box cars are, for the most part, general service cars and as such are destined for interchange. In fact, they are off their home systems 75 to 85% of their life, so the owner doesn't reap much benefit from aluminum's lighter weight. Since box cars are rarely loaded

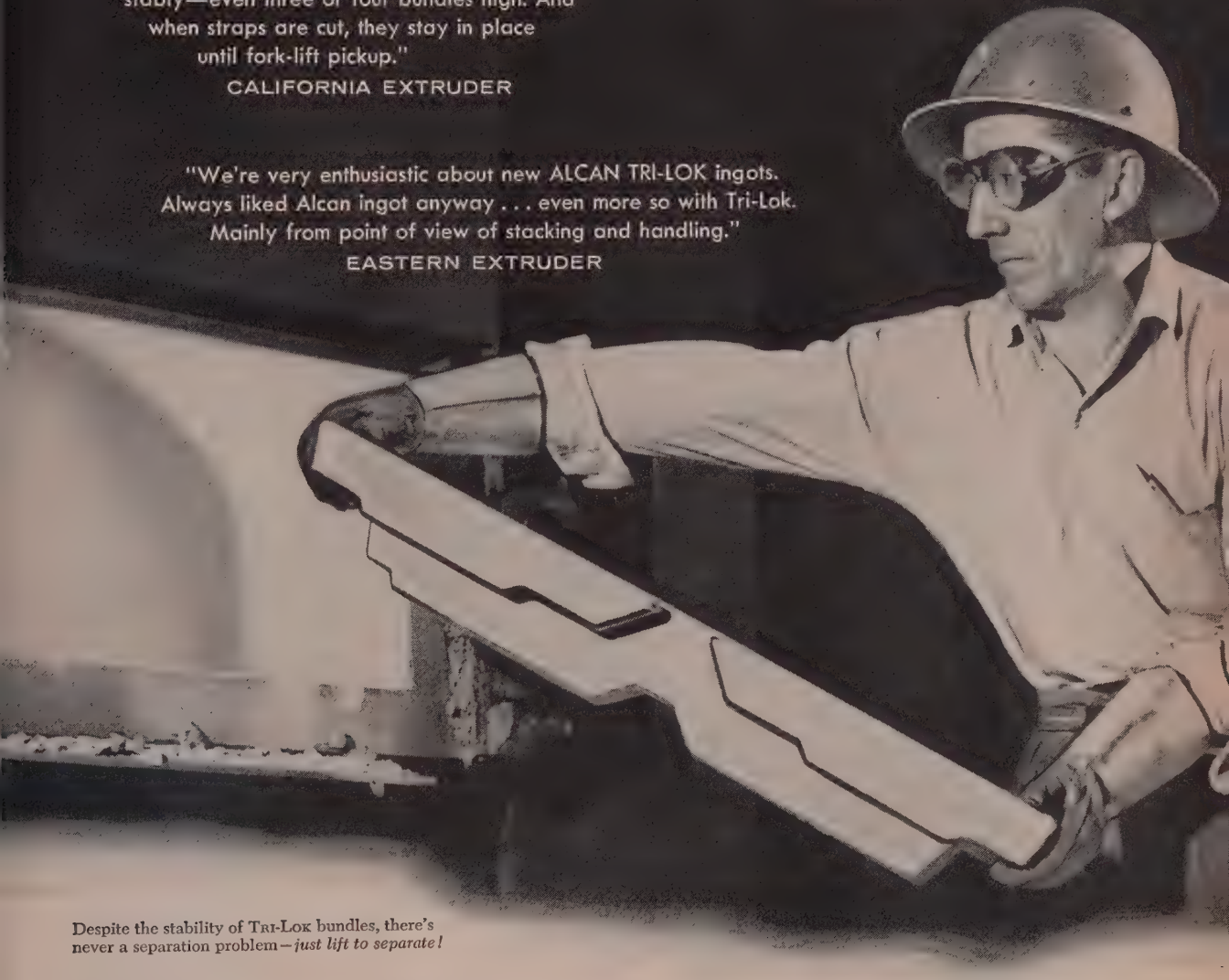
■ *Welding slope sheets for aluminum hopper cars at Magor plant.*

"Very pleased with all the advantages offered by Tri-Lok. Always prefer shipments to be made in this form due to handling ease, safety and convenience."
NEW YORK SMELTER

"TRI-LOK ingots cut our unloading time quite a bit. They don't shift in bundles . . . but stay in place for easy storing and fork-lift handling."
MIDWEST ALUMINUM PRODUCTS MANUFACTURER

"ALCAN TRI-LOK ingots arrive compact and stay compact until we use them. They stack safely, stably—even three or four bundles high. And when straps are cut, they stay in place until fork-lift pickup."
CALIFORNIA EXTRUDER

"We're very enthusiastic about new ALCAN TRI-LOK ingots. Always liked Alcan ingot anyway . . . even more so with Tri-Lok. Mainly from point of view of stacking and handling."
EASTERN EXTRUDER



Despite the stability of TRI-LOK bundles, there's never a separation problem—*just lift to separate!*

Here are some typical examples of what users are saying about Aluminium's newest ingot development—ALCAN TRI-LOK ingot.

Designed for more efficient handling, the new ingots lock one to another, not in just one, but in three different ways. The resultant stability means greater speed, simplicity and safety wherever ingots are handled.

In car unloading, you find bundles arrive in excellent condition ready for quick pickup by fork lift truck. In-plant moves, too, are greatly simplified because no pallets or special slings are needed. Even after strap removal, TRI-LOK bundles remain securely intact on trucks, floors or inclined ramps.

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to capacity, this further weakens the case for aluminum.

Despite present-day deterrents to the all-aluminum box car, it should eventually become common equipment on U. S. systems.

Not long after The Southern bought its aluminum bulk freight cars, they ordered from Pullman-Standard 200 *steel* box cars with aluminum doors, running boards and brake steps.

At about the same time, the Southern Pacific, one of the largest western roads, ordered 200 aluminum hopper cars, built by American Car & Foundry Corp., and destined to be kept on SP's own system. SP has not released details of this order, but Alcoa, Kaiser and Reynolds probably shared in the sale of the aluminum.

Big: Parts Replacement

Aluminum salesmen are working hard on box car components replacement. Early returns of a questionnaire sent by Modern Metals to 30 of the nation's largest roads tell of the indifference of some and the activity of others in replacing steel with aluminum.

Some orders appear to be experimental; others are big enough to suggest that aluminum was purchased as an accepted replacement material, mainly for box cars. In no case, though, has there been signs of a continuing replacement program involving aluminum.

Doors could be the biggest box car replacement item, because steel doors add a lot of weight to a car and are vulnerable to rust.

In some cases, aluminum doors consist of a series of welded, wide-faced interlocking extrusions set in a welded extruded frame. Quite a different design was that used for 25 carsets installed on standard box cars by the Pennsylvania Railroad in 1957. Unit weight of these doors, according to Kaiser Aluminum, designer and developer, is 256 pounds, using weldable alloy 5086. A comparable door in steel weighs 523 pounds.

The door upper edge is of ⅛-inch shaped aluminum sheet. The bottom edge is a standard bottom door-section formed from 5/32-inch sheet. Three corrugated panels are .109-inch thick.

"The aluminum sheet was formed without difficulty in standard dies," Kaiser said. "An aluminum drawing compound was used at a lower die pressure."

Simple jigs were used for assembly. Electrolytic action between aluminum and iron and steel parts is prevented by zinc chromate primer on the aluminum and non-lead primer on ferrous parts. For added protection, a layer of alumilastic paste is applied prior to joining dissimilar metals. After three years service none of these doors had been shopped for repairs.

Aluminum doors installed on a Rock Island Lines box car in 1959 are made up from aluminum panels adhesive bonded into unitized frames made of Heliarc welded aluminum extrusions. The door, a Pullman-Standard-Alcoa development, has been improved and is being installed in four cars of a western road.

Pullman-Standard reports that the design is so strong it will safely allow them to take out a little weight without sacrificing strength. Its current weight, about 314 pounds, can be reduced substantially.

■ ***Running boards for covered hopper and box cars are an excellent aluminum application. Morton Mfg. Co. made these sections for Southern job.***

"It will match the overall strength of our present steel door," a Pullman-Standard engineer said. "Local resistance to hard blows will be learned after the doors have been in service for a while."

Opening a 650-pound, 9-foot steel box car door is hard work, particularly on a cold winter day. The aluminum door can be moved with one finger.

Welding is Pullman-Standard's forte, but the alloy selected for these panels would anneal if welded, so adhesive was used. The adhesive-bonded door is equally strong and water-tight. The adhesive and its procedures are very similar to those used in bonding stress members of aircraft. It sounds as though P-S might be developing an aluminum door that can be priced competitively with steel doors.

In its recent order for 200 box cars, The Southern was bowing to accepted theory in not specifying aluminum roofs. Other roads would reap the benefit of the reduced weight such roofs would bring.

Canadians Like Aluminum

Close to 8000 aluminum roofs have been installed on Canadian railroad box cars, but aluminum is a Canadian home industry, whereas steel is not. Aluminum has a better price position there vis-a-vis steel.

Canadian National Railway is government-owned, which makes selection of aluminum for freight car components even more likely. The government wouldn't be too inclined to quibble over the price of a home industry product.

But the Canadian Pacific, Canada's other major road, is also increasingly receptive to aluminum. Both systems send freight cars into the U. S. on interchange, but they must be returned to the home lines immediately, even if they have to deadhead home. Canadian roads, then, get maximum benefits from the use of lightweight, corrosion resistant aluminum in freight cars.

Few U. S. roads have used aluminum for box car roof replacements. Modern Metals' survey of the largest Class I roads has not revealed one such application. Grand Trunk Western Railway equipped 300 of its PS-1 box cars with aluminum roofs early in 1958 at a unit cost of about $180 more than the cost of conventional steel roofs.

Since this American road is owned by Canadian National, any misgivings about premium prices (American goods and services had to be used) were probably erased by CNR's confidence in aluminum. Even so, some 7500 Grand Trunk Western box cars still have steel roofs, but no one would want to make book on their chances for replacement with aluminum roofs.

According to aluminum salesmen the alloys that can take the draws necessary for box car roofs are too expensive for most American roads. The metal must have good elongation and fatigue strength. Alloys 5050 and 5052 serve admirably in this application; the GTW job used 5050-H32 alloy sheet, .081 inch thick.

Most recent development is Illinois Central's purchase of aluminum for one or more experimental box car roofs. Standard Railway Equipment Co. will fabricate the Alcoa aluminum using conventional tools.

The fact that I-C refers to the aluminum as building sheet has created speculation as to the physical properties of the material. Is it non-specification sheet treated to take the required

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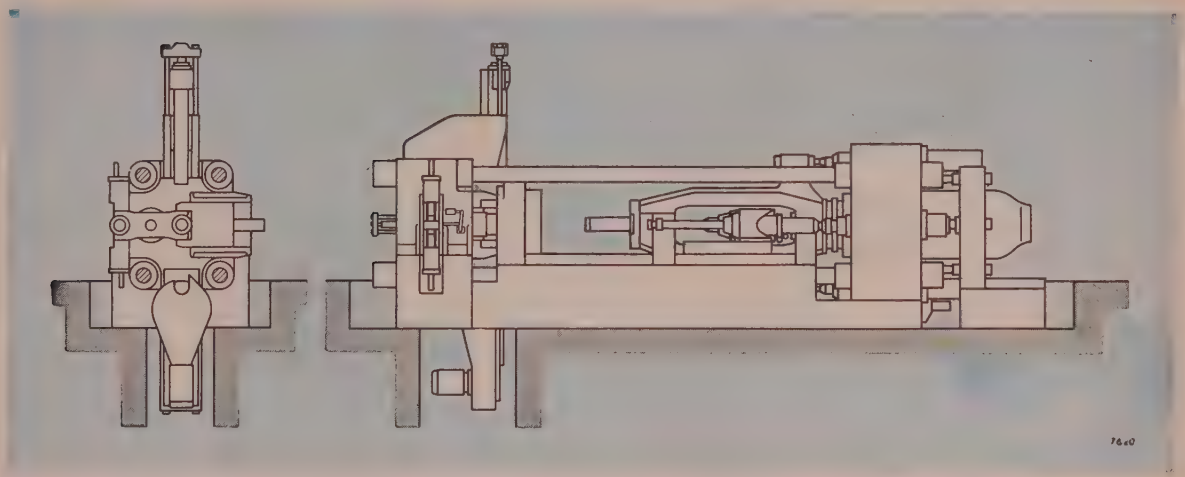

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- Improved quality of extrusions and longer tool life through the incorporation of cooling arrangements for the billet container, die and mandrel.

Inspecting a 2750-ton extrusion press of the four-column type, with rotary die head, demonstrated under workshop conditions on the occasion of the SCHLOEMANN Congress held at the MAN plant at Nuremberg.

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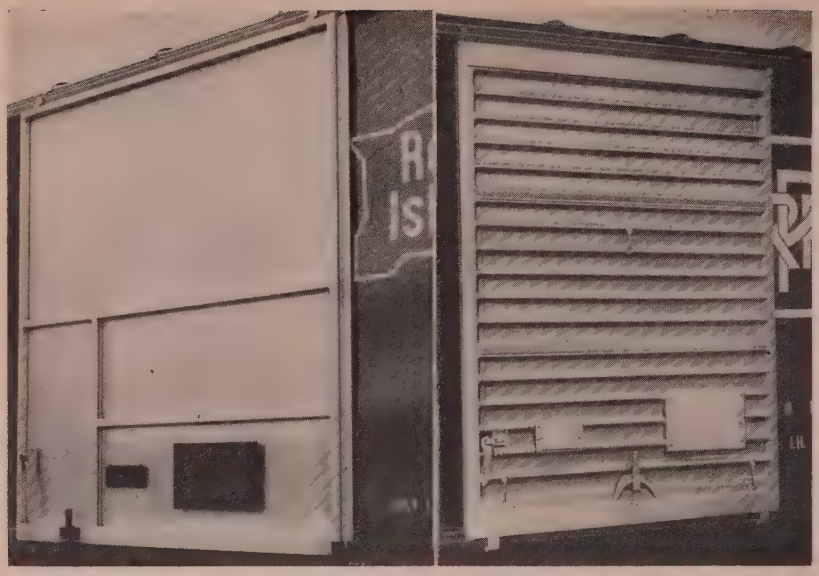

■ *Doors are one of the most important specialty items because the steel types are unwieldy and are vulnerable to rust. Door at left is one developed by Alcoa and Pullman Corp.'s Pullman-Standard Div. It is a combination of welded extrusions and adhesive bonded aluminum panels. The other door is in use on some Pennsy cars and are doing very well after three years' service. These are made up of three big corrugated panels, .109-in. thick, and were developed by Kaiser.*

draws? Or is it really a dependable specification sheet, called building sheet for pricing purposes?

The latter would seem to be the case; if so, it points up the devious methods which must sometimes be used to win applications for aluminum.

According to Kaiser Aluminum, who shared the Grand Trunk Western roof order with Alcoa, the intermediate sections — 10 for a 40-foot car, 13 for a 50-footer, measure 48 inches long by 120 inches wide (car beam). End sheets are 44 inches by 120 inches. Small parts are seam caps which join the sections, and saddles to hold running boards in place.

Running Boards, Too

Running boards are a worthwhile application in which aluminum has given long, dependable service. An early postwar installation on an Illinois Central refrigerator car is still in excellent condition after 14 years' service.

This running board was made by Morton Mfg. Co., a Chicago firm long associated with railroad car components and other equipment. Morton is building running boards and brake steps for the 200 Southern box cars, and supplied the running boards and platforms for that railroad's aluminum covered hopper cars.

The Morton running boards have a finished width of 19½ inches and are made in section lengths appropriate to the length of the car. They are made of 5052-H31 alloy, .125-in. thick.

Morton makes the longitudinal sections by perforating a 50 x 72-inch blank, then cutting it down the middle to produce two sections. Perforated sections are then put in draw presses to produce the flanges and ears for fastening to the box car top.

Latitudinal running boards measure 27½ x 48 inches. They are given a welded z-bar stiffener down the middle of the underside, and welded collars to take a two-directional grab bar.

The combination of large perforations to permit run-off of snow and rain, and small, raised button-type perforations to give the walk its non-slip feature make a very effective design.

Running boards' days could be numbered, however. While the ICC regulations insist on box cars being equipped with them, various railroads forbid brakemen to walk along the roofs of cars while they are in motion. Brakes are now controlled from the ground or at least from a ladder at the corner of the car. Chances are that box car running boards will eventually be eliminated, though they are still important on covered hoppers.

One of the most important applications of aluminum box cars is a simple hollow extrusion somewhat shorter than the car's inside width, and equipped with a simple mechanism at each end to attach it to slots in the walls. It keeps box car loads snug and well anchored to prevent damage in transit.

These lading restraining bars, or cross members, replace a wood-steel combination which weighs 70 or more pounds and is difficult for two men to handle.

According to Evans Products Co., Plymouth, Mich., one of about six manufacturers who supply this accessory, the raw extrusion weighs about 28 pounds, is about four inches along the long side of its rectangular shape, and has a wall thickness of about ¼ inch. When the cast iron end fixtures are added, unit weight goes to 46 pounds.

Lading bars are used in special DF (Damage Free) or SL (Safe Load) box cars for carrying certain kinds of fragile or vulnerable products. There are about 32,000 of these cars at present. Opinion varies as to the number of cross members per car, but Reynolds Metals figures an average of 40 bars per car.

The only points that can be made for the wood-steel cross member is that it is nailable and lends itself to cross-bracing; also there is less temptation to steal it than the new aluminum design. So, with creditable foresight, a committee of about six roads and the Association of American Railroads are exploring the possibility of a standard interior for special box cars which will have mobile aluminum lading bars attached at one end. Conceivably they might be moved around in tracks, but details of this study are not available.

In its development work on this accessory in 1955, Reynolds reasoned that the aluminum bar would give better resistance to sudden impacts. "Aluminum's low elastic modulus enables it to deflect three times as much as steel under identical loads," explains Reynolds' Neil Zundel, director of transportation market sales. "Also aluminum beams, when bent, can be straightened without losing their strength. And non-rusting aluminum will outlast steel beams.

"But most important is the fact that one man can handle them as easily as two men could handle steel beams," Zundel said. "The problem was to come up with a design which met all these qualities and could still be competitive price-wise."

Hollow extrusions were the answer, but Reynolds turned to other possibilities when early production costs of these extrusions proved too high. Welded, heat-treated formed sheets were unsatisfactory, as were extruded channels, adhesive bonded to form a rectangle.

"Meanwhile, we continued to look for a less expensive way to produce the hollow cross beams," Zundel said. "By carefully studying mass production methods and overall requirements, we decided we could market the hollow extruded sections profitably."

"The shape is extruded by placing a hollow billet into the container of the press and using a mandrel fixed at the front end of the ram," Reynolds' Ernst de Ridder explained. "The rec-

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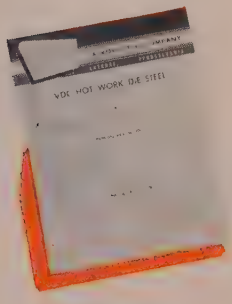

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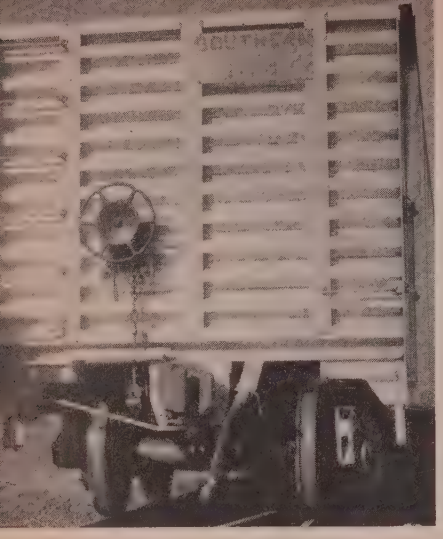

■ *End pieces of giant gondolas are combinations of plate and extrusions which were joined by a unique welding set-up.*

■ *Lading restraining bars are an important new application of hollow aluminum extrusions. As many as 40 might be used on special box cars.*

■ *Rock Island Lines has a captive malt transport operation. Pictured is one of two experimental piggyback carriers developed by Reynolds. Sanitary feature of big interlocking extrusions is important for this application.*

tangular cross section of the mandrel produces the inner contour of the beam, while the rectangular opening in the die forms its outer contour. In another method, the moving mandrel is replaced by a short one fixed at the porthole die."

Reynolds reports that more than 700 carsets were sold to several roads in less than four years. The Santa Fe ordered 7,000 bars for about 400 cars. Other roads are ordering a few experimentally.

"The potential market for just this one product is about 20 million pounds of aluminum annually," Zundel said.

Box car linings are another growing application for extrusions, mainly for reducing car maintenance, but also for safety and sanitation. Four of the roads responding to the Modern Metals survey have, since the beginning of this year, bought more than 100,000 pounds of extrusions for lining 135 box cars. Doubtless the actual total is considerably higher than this.

An aluminum box car lining can be less expensive, initially, than the steel type which requires rubber or plastic protective coatings. These coatings have to be replaced frequently because of damage by fork lift trucks and other materials handling equipment.

Steel rusts, becomes unsightly and can impair a car's usefulness. Aluminum lining doesn't rust; and the individual extrusions are easier to replace when badly damaged. Because aluminum is non-sparking, it is considered particularly desirable in shipping inflammable commodities such as baled cotton.

The extrusions are installed in long lengths horizontally, usually of heavier section at the bottom, where lift trucks are a threat. Wall heights vary. A B&O job involving 50 cars was 42 inches high. On another road, extrusions were put in to a height of about six feet.

The Big Reefer Mystery

Refrigerator cars are the heaviest railroad cars, weighing anywhere from 55,000 to 90,000 pounds in steel. A reefer car door is likely to tip the scale at about 1300 pounds.

"Door manufacturers have made 'em of aluminum and knocked this weight down to 750 pounds," an aluminum industry man said.

But the reefer is mainly steel for the usual reasons of price and steel's long acceptance as *the* construction material. Just when aluminum will make appreciable penetration of the reefer market is problematical.

Reefer car builders are experimenting with aluminum, seemingly in ignorance of the tremendous strides made by the Canadian roads in cooperation with Aluminum Co. of Canada.

One builder is reported to be experimenting with aluminum and plywood panels for liners, but information is sparse. The firm admitted that plastics are making gains in this field. A recent newspaper report pictured a plastic molding operation for reefer doors — Cyclolac plastic "holders" which would be filled with foamed polystyrene. Pacific Fruit Express, perhaps the biggest builder of reefers, ordered this new door for 1025 new cars.

"Plastic makes [the doors] 400 to 500 pounds lighter and fungus proof," the photo caption said.

Meanwhile, here is a good market for aluminum — about 3000 reefers each year. And there are more than 115,000 existing cars which, for the most part, are more vulnerable to corrosion than any other type of car.

Some 111,000 old reefer cars are still rolling — bunker cars which are loaded with ice and salt for the refrigerant. The brine that results is hard on everything it comes in contact with. For these cars, aluminum should be an important replacement material (galvanized is the original metal) yet little headway seems to have been made.

"The main application for aluminum seems to be floor racks made of extrusions," an engineering executive of one of the reefer builders said. "An experimental use is side doors. Still another is load divider doors, more like movable partitions, to keep loads from shifting and to keep them separated; no insulation, just a bracing door. This seems like a good application for sheet and extrusions."

This informant had little to say about aluminum for bunkers or brine tanks in the old type cars. They plan to stay with galvanized. Except for the refrigerator car built by the Illinois Central in 1946, he didn't think there was another all-aluminum reefer in service in the U. S.

The transition from bunker cars to mechanical reefers has slowed down somewhat, according to one car builder. There are about 4000 of these in service. Mechanical reefers eliminate corrosion caused by brine, but the equipment increases the car weight considerably.

Six hundred mechanical cars being built for the Santa Fe by General American Transportation Corp. are 50 feet long and weigh 90,000 pounds each, light weight. Aluminum's weight saving feature would be important.

The Choice Ones:

Excellent applications for aluminum in reefers would be inside lining of sheet or extrusions, car ends, sides, roofs, floors / and floor racks, ceilings, ducts, and ice bunkers. Aluminum engine blocks for the diesels (about 50 hp) and the propane engines used to drive the compressors in these mechanical cars seem to be reasonable applications.

The 1025 Pacific Fruit Express reefers getting the plastic doors are also being given aluminum ceilings. The sheet comes from Kaiser. They will also have extruded floor racks, source unknown.

(*Continued on page* 86)

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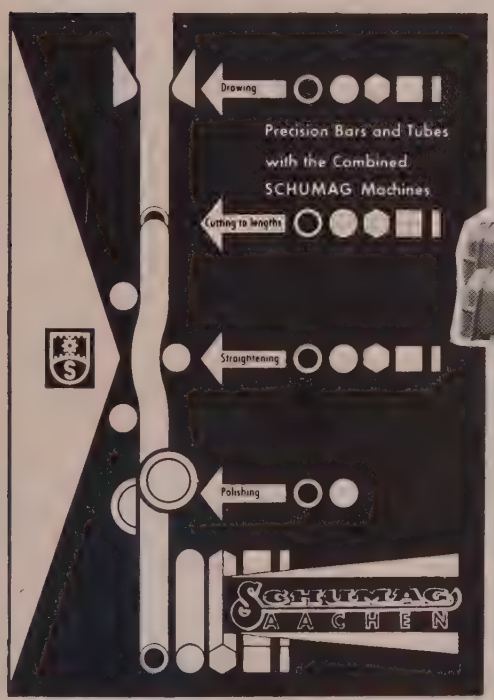

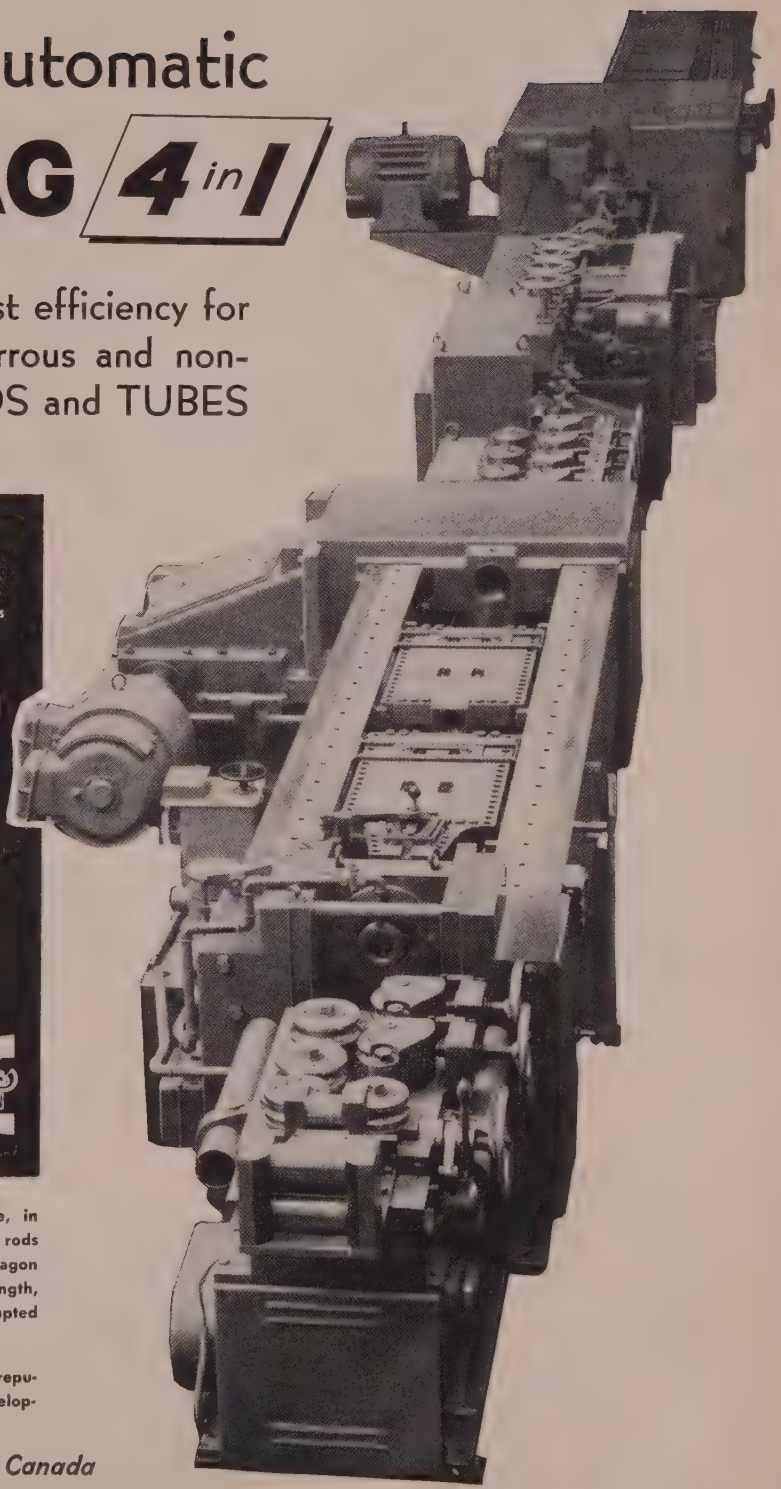

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■ *Workers on Canadian box cars are riveting aluminum seam caps to roof sheets using an automatic squeeze riveter. Canadian roads generally make substantial use of aluminum. Some 8000 box cars are equipped with aluminum roofs.*

A recent statement of G. H. Baillie, operations vice president of Canadian Pacific Railway, is in direct contrast with the attitudes of U. S. refrigerator car builders:

"Aluminum has been used to a great extent in rebuilding programs of refrigerator cars. The aluminum has been used for overhead ice tanks, side and end flues and floor sheets. Applications started in 1954 and to date we have 1700 refrigerator cars with aluminum ice tanks. Of these 615 also have aluminum flues and floor sheets.

"Aluminum was adopted for the tanks to extend their life and reduce replacements. Previously they had been made of galvanized steel and had a life of not more than seven years. The aluminum tanks have been designed for a minimum life of 10 years."

Considerable pitting took place in initial aluminum brine tank installations after three years. This was caused by foreign matter collecting in the tanks. The use of sacrificial anodes arrested this deterioration: changing the alloy from Alcan 57S-½H to 57S-H34 clad with 7% Alcan 72S on both sides eliminated pitting on subsequent installations.

Replacement possibilities in hopper cars include end platforms, and longitudinal and lateral running boards and hatch covers on covered hoppers. An important new development are aluminum hopper gates.

The idea of aluminum outlet gates of covered hoppers seems far-fetched to those who don't realize that many commodities carried in this equipment are contaminated by steel. Various plastic coatings are applied to interior surfaces of steel covered hoppers for this reason. But such coatings are difficult to apply properly to frames and gates of the outlets.

Enterprise Railway Equipment Co., Chicago, has designed a highly efficient aluminum outlet gate for covered hoppers. Enterprise had given much thought to such a component, even though Aluminum Co. of Canada had contended that gates were not a good application for aluminum. In fact, when Alcan developed their own aluminum hopper car for bauxite about five years ago, Enterprise was given the job and equipped the cars with steel gates.

Unloading is an important consideration in hopper car design. Sliding doors, rather than drop gates, are essential because of the frequent need to allow only a part of the load to drop out in a certain part of the unloading area by sliding the gate open only partially. The best feature of aluminum in this application was excessive wear of the aluminum door plate in its aluminum gate frame. Enterprise solved this problem by casting in stainless steel strips at these points.

The aluminum gate got its chance about a year ago when The Southern Railway indicated its interest in its Enterprise pilot. Alcan Kaiser and Reynolds at that time could recommend aluminum for the job.

"We received three different answers," C. W. Lindstrom, operating manager of Enterprise recalled. "Reynolds was far from positive about it, but they finally came through, donating the metal, sharing in the development costs and sending their foundry experts around."

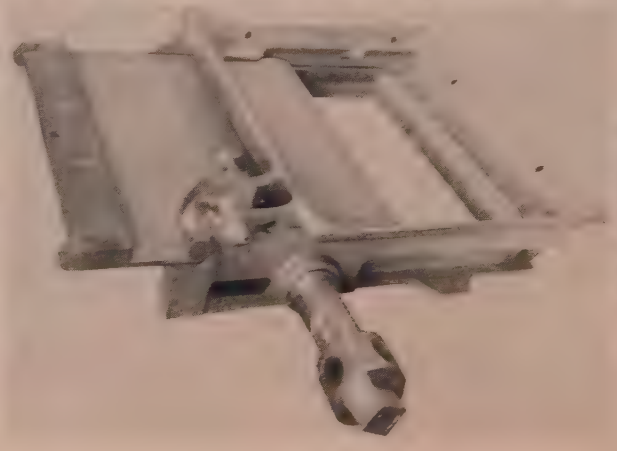
Ironton Aluminum Division of The Detroit Malleable Iron Co., Ironton, Ohio, made the castings. "They modified some steel patterns for us, a very tricky job because the three-part flasks were very unsuitable for aluminum," Lindstrom said. "Nevertheless, they did a great job.

The steel outlet weighs 250 pounds. The aluminum version, with steel handle, shaft pinions, locking dog and seat pin, weighs only about 125 pounds.

The Southern particularly wanted the aluminum gate installed on the last 75 Magor cars which are primarily food handlers. This was out of the question because Magor was already producing them, and Enterprise hadn't even made its patterns.

Since then, however, a triple hopper car having an aluminum superstructure has three cast aluminum outlets with stainless steel wear surfaces, as well as three conventional steel gates. This car was exhibited last month at the AAR Mechanical and Electrical Section Convention in San Francisco and created great interest. Reynolds will buy it for continued field testing.

Enterprise Railway Equipment Co. is well along in substituting aluminum for steel in components for the pneumatic-vacuum unloading of covered hoppers. This technique is growing more



■ *Pilot model of aluminum hopper gate made by Enterprise Railway Equipment Co. In this model, stainless wear strips are screwed in; production units will have cast-in strips.*

popular, according to Lindstrom. A lading outlet assembly is applied to one of the hopper sheets and an air inlet assembly to the opposite hopper sheet.

An aluminum conduit or bridge rests against the hopper sheets just above the door, covering the air inlet and the lading outlet to form a sort of wind tunnel. A slight gap between the top of the main outlet gate and the bottom edges of the conduit allows the lading to be sucked into the air stream when a vacuum is pulled. The commodity is sucked through a hose into the receiving bin.

Vacuum unloading is convenient for foods and chemicals, many of which defy gravity because they naturally tend to bridge. Vacuum unloading is recommended for such commodities as grain, sugar, sand, plastic granules, bentonite clay, mustard seed, animal feed, polystyrene, sodium sulphate, and koalin clay. The list is much longer.

The entire vacuum outlet weighs about 25 pounds. In aluminum, it would be a proper extension of the aluminum covered hopper car, according to Lindstrom, "because there are no moving parts."

Tanker Use Growing

Tank cars are not usually furnished to shippers by the railroads. There are close to 170,000 tankers, the greatest percentage of which are owned by leasing companies. Railroads own about 6000 tankers, but these are used mainly for transporting diesel fuel for their locomotives.

General American Transportation Corp. built its first aluminum tankers in 1928 for the transport of glacial acetic acid. Alloy 3003 was used. The cars are still in service today.

Aluminum's use in tank cars has been dictated by the need to transport many commodities that cannot be held in steel. Aluminum tankers came into their own between 1949 and '53 — to haul nitrogen fertilizer solutions which are hard on steel.

According to an engineer at GAT the aluminum alloy most used in tank cars is 5052, but "if you want somewhat higher strength, 5154, can be used." Alloy 5454 satisfies strength requirements that are even higher. Also, two controlled alloys that are used for tanks in hydrogen peroxide service include 5254, a modification of 5154, and 5652, a modification of 5052. These alloys are low in iron and copper content."

Tank wall thicknesses range from ⅜ inch up to 1-⅛ inch depending on what the car must carry. Weak acetic acid, a "low pressure" commodity with a safety vent limit of 17 psi, requires a tank wall thickness in the lowest range.

At the other end of the scale are cars built to operate at higher pressures —

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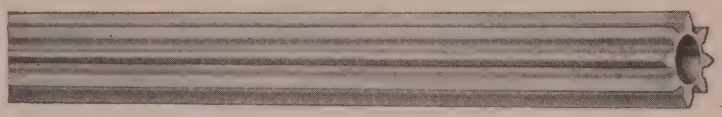

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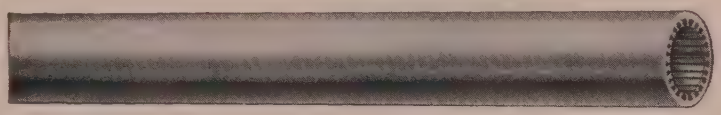

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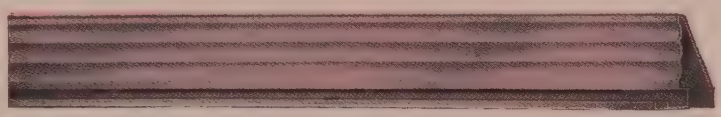

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say 225 psi — for carrying fertilizer solution with free ammonia. Here the metal is around 1-⅛ inch plate.

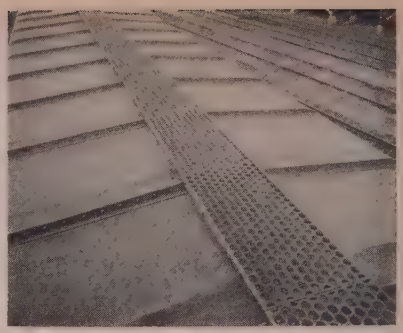
The most common tank car capacities are 6. 8. and 10,000 gallons. Some are as small as 4000; others as large as 20,000 to 50,000 gallons. These giant aluminum tank cars are leased by Celanese Corp. of America to carry acetic acid and acetic anhydride.

The dished tank heads are pressed out of flat circles. The cylinders are built from either curved plates formed in almost a complete circle and welded shut, or from curved plates three sections of which would form a complete cylinder when welded together. A series of these cylinders make up the desired length of tank.

Some 2600 of GAT's fleet of about 50,000 cars are aluminum; about 2000 of them are leased, and the biggest users are Allied Chemical, Du Pont, and The Dow Chemical Co. They're all made at GAT's works at Sharon, Pa.

An 8000-gallon tank made with 5/8-inch aluminum plate weighs about 6200 pounds; a 10,000-gallon tanker of the same material about 7600 pounds — in both cases exclusive of the steel trucks and underframe.

All tank car builders buy top unloading fittings from specialty manufacturers. Competitive as they are, the builders cooperate in supplying standard unloading hook-ups to ease the task for car users. All tank cars are painted; it hides fabricating scars.



■ ***First, and perhaps the only all-aluminum refrigerator car in U. S. was built by Illinois Central in 1946; is still in excellent condition. That's a Morton running board.***

Tank car operations provide the best example of how leased equipment serves railroad needs in peak periods without being a financial burden in slack months. Fewer cars do a bigger job at less cost to the users. Cars of the nation's tank car fleet are rarely idle.

In the case of box cars and other types, western railroads are pooling their resources to form a leasing company that will buy the cars then lease them to the roads when needed. Thus, the roads will only pay monthly rental costs, will have no burdensome outlays for new car or unfavorable depreciation, and be free of maintenance costs.

Mergers Will Help

Rail mergers will also improve the climate for aluminum in the railroad market. For instance, an eastern merger that would unify five or six systems under one management would make aluminum equipment far more attractive by creating a situation much like Canada's, where two major roads operate what are practically vast captive systems.

What's more, a larger system with greater equipment needs is in a much more favorable position to reap a price benefit from long production runs of aluminum sheet, plate and extrusions. This is what greased the ways for the Southern Railway order.

The per-pound price of the aluminum for this order (plus whatever guarantees Reynolds might have made to get the order) are deep, dark secrets. But is is generally believed that Reynolds was able to make a profit from a relatively low unit price because of the sustained rolling schedules. Imagine what an aluminum producer could do with an order twice that of the Southern job!

When railroaders are questioned about aluminum usage in their industry, they rarely voice outright approval of the material. More often than not they criticize it — either on the basis of price or past performance.

One executive thought that aluminum was out as far as his road is con-

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cerned because they had an experimental open hopper car which had had its bottom plates burned out several times by fires which were built under the car to thaw out loads of coal.

Another man described a solid bottom gondola which hadn't been able to take the abuse of clamshell unloading.

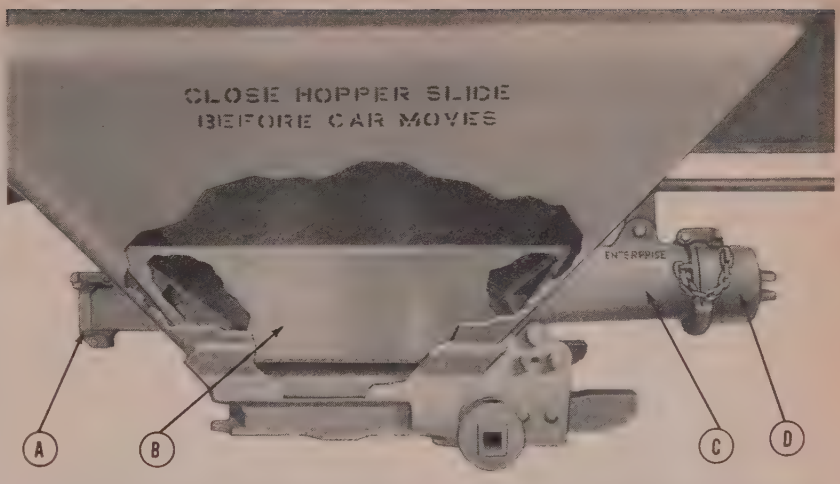
Still another executive said he'd like to have some aluminum equipment, but price stood in the way. One said his road would be tempted to go to aluminum in freight cars if they could be certain of keeping the cars captive. He didn't think this could be done, however.

But one can't generalize about American railroads. The purchasing price may be important at one road because its Purchasing Agent exerts an important influence in a sale.

Early last month, D. B. Jenks, president of the Rock Island Lines, told a convention of railroad purchasers:

"And without the purchasing officer recognized on the same executive level as the chiefs of engineering and production, management will find itself limping along as inefficiently as one of our old-time compound locomotives with a simple engineer."

Elsewhere, a mechanical department is likely to be the big influence in the selection of a material or product. Even the traffic department can get into the purchasing operation; the traffic men are the road's sales force, and they can go out of their way to influence a purchase that will sit right with one of the road's customers.

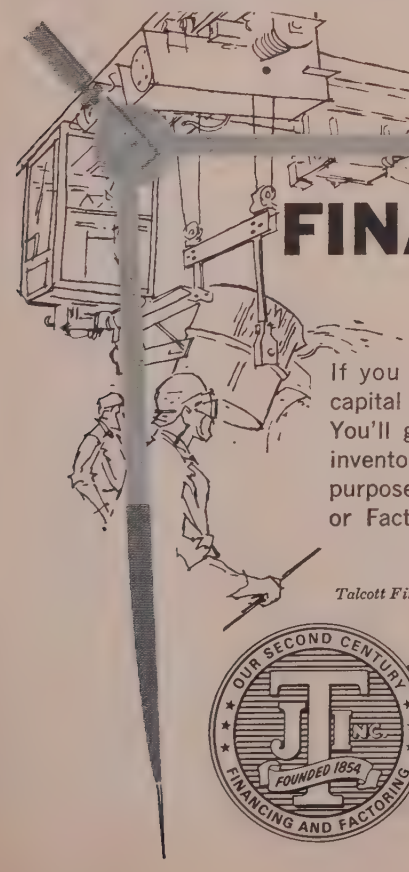


■ ***Pneumatic unloading devices for covered hopper cars will be sound aluminum application. Enterprise Railway model has air intake (A), inverted V conduit (B), outlet pipe for product (C), and pipe cap (D). Flexible hose would be attached, leading to receiving tank or bin. The assembly is a natural for aluminum cars.***

It seems very likely that the astronomical purchasing figures mentioned by Mr. Jenks have, over the decades, thrown a pall of indecision over many men charged with spending the railroads' money. It has to be spent on a sure thing. Change can be worrisome when it might mean spending millions on inadequate equipment.

One remembers the old standard sleepers which the roads put up with for close to 50 years; they probably contributed as much as anything to the slow death of Pullman traffic.

But the action taken by The Southern Railway and Southern Pacific seems to have jolted the railroads. Chances are that in their selection of aluminum these two roads will cause other systems to re-examine their policies — and save themselves a big lump of money.



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News Products and People

High Purity Die Castings Now Being Color Anodized

Super purity aluminum die castings that can be anodized to a bright finish have been successfully produced for the first time, says Nelmor Mfg. Corp., Euclid, Ohio.

The process was developed by David Morgenstern, president of the company and inventor of the vacuum die casting machine. He was closely assisted by Howard Fromson, president of Fromson Orban Co., Inc., New York.

Fromson Orban's high purity alloys, called Lurium (99.99% pure aluminum), were used to achieve the brilliant, high finish castings. And when anodized, he said, the resulting finish is the brightest ever obtained in a die casting.

Fromson Orban has been named the exclusive sales agency for the Lurium die castings, which will be produced by Nelmor. The castings are offered in the same range of anodized colors as wrought aluminum, as well as in clear anodized form.

The Lurium die casting is expected to enter many markets. Applications could include appliance trim, giftware, jewelry, light fixtures, etc.

The Lurium castings also possess excellent corrosion resistance, say the developers, and are expected to find many applications in the marine, plumbing and building hardware fields.

One possible drawback of the new process, the cost of material (almost twice that of commercially pure aluminum), was posed to Fromson. But he feels this is a slight problem and those who want the added appearance of high purity die castings will be willing to pay the difference.

Current plans call for 100,000 pounds of castings to be produced a month, but Fromson feels this will increase in a short time. He says there are many prospects already on file who asked for castings when his firm was trying to sell them sheet or strip.

Aluminium Buys Smelter; Expands in South America

After failing in its attempt to buy Apex Smelting of Chicago last May, Aluminium Ltd. entered into a joint venture to purchase a smelting operation in England.

In conjunction with Enfield Rolling Mills Ltd., England, Limited has formed a new company to acquire the secondary aluminum smelter at Bradford, Yorkshire, currently operated by Enfield.

The new company, to be known as Alcan Enfield Alloys Ltd., will have an issued capital of $1,400,000, with each partner owning 50%. The firm will produce a large range of foundry alloys from scrap and primary aluminum.

Alcan has also announced that its subsidiary, Aluminio del Uruguay, S. A., is expanding its facilities in Montevideo, and will almost double its sheet, foil and extrusions capacity.

The company is installing a new 1500-ton extrusion press, and a rolling mill of 1800-ton capacity has been ordered.

French Producer to Build Reduction Plant in Greece

The French aluminum producer, Pechiney, has finalized plans with the government of Greece under which the firm will build and manage an aluminum smelter in Greece.

The primary reduction plant will have an annual capacity of 50,000 tons of aluminum. A plant to produce the 100,000 tons of alumina needed for that volume will also be constructed. Financing of the estimated $75 million project will be by a French-Greek company being organized. A Greek industrial group, Niarchos, will help build the plants.

United Pacific To Build Primary Aluminum Smelter

If present plans go according to schedule, another primary producer will enter the aluminum production scene late next year.

United Pacific Aluminum Corp., Los Angeles, has taken an option on a 300 acre plot near Longview, Wash., on the Columbia River, and plans to start building a reduction plant on the site this summer. Construction of the new smelter will cost about $10 million.

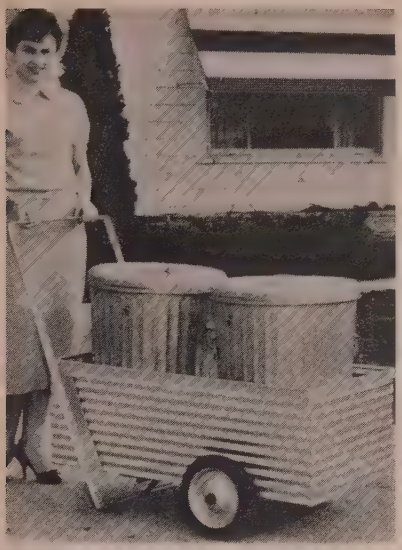
Bauxite will be shipped by boat from Australia, Africa and the Orient. This helped determine the site of the plant since Longview has a deep water port.

The firm is also negotiating for an additional 185 acres. Company officials say the area offers many advantages, in addition to its port. It has an abundant power supply, is close to rail transportation, and the firm's fabricating plant.

United Pacific will also install rolling facilities in Longview. The combined operation will supply the Los Angeles plant, which manufactures enameled aluminum venetian blinds and baked enameled aluminum coil stock.

Some 280 persons will be employed at

Longview initially. But if business is good, says the firm, future operations will require 1000 employees.



Light Weight Utility Cart Aids in Household Chores

An aluminum garden and home utility cart weighing only 22 pounds can be used for a variety of household chores such as hauling leaves, fire wood, tools, laundry, food, etc.

Alumi-Cart is built by H & P Mfg. Co., Inc., 330 W. 40th St., Indianapolis 8, Ind. Its price is $24.95, FOB Indianapolis.

New Alloys Resist Effects of High-Temp Steam, Water

A new group of aluminum alloys has been developed by Alcoa to resist the corrosive attack of high temperature steam and water. The aluminum-iron-nickel alloys are claimed to withstand the sharply deteriorating effect of high purity water at temperatures up to nearly 700°F.

These new compositions might be useful as cladding for uranium fuel rods used in atomic reactors, according to Alcoa. In advanced reactors, the cooling medium—high purity water—is heated to nearly three times the 250°F temperature reached in present units. Commercial aluminum alloys now used are limited to containing steam and high purity water in temperature zones up to 450°F.

The new Alcoa alloys were tested in both wrought and APM (aluminum powder metallurgy) forms. An APM alloy, containing 4.81% iron and 7.03% nickel, offered the best corrosion resistance at 680°F. The initial slight corrosion rate diminished quickly to a point defying detection of further deterioration, says Alcoa.

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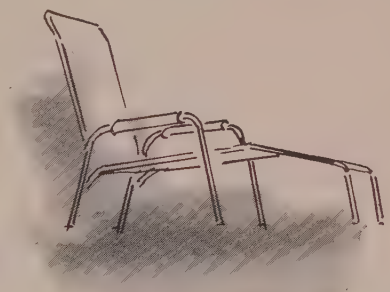

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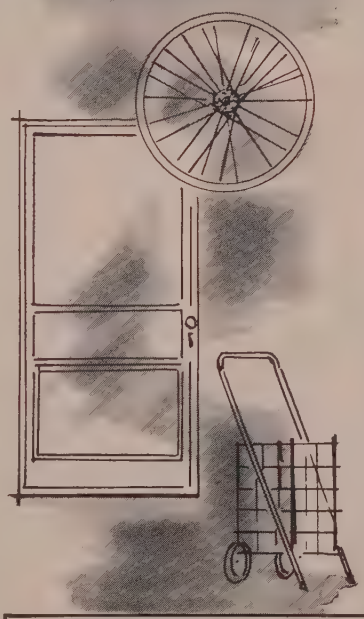

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ON ZINC—Iridite plus Irilac gives longer product life, brighter appearance. Color range—clear Iridite to olive drab, plus colored dyes.

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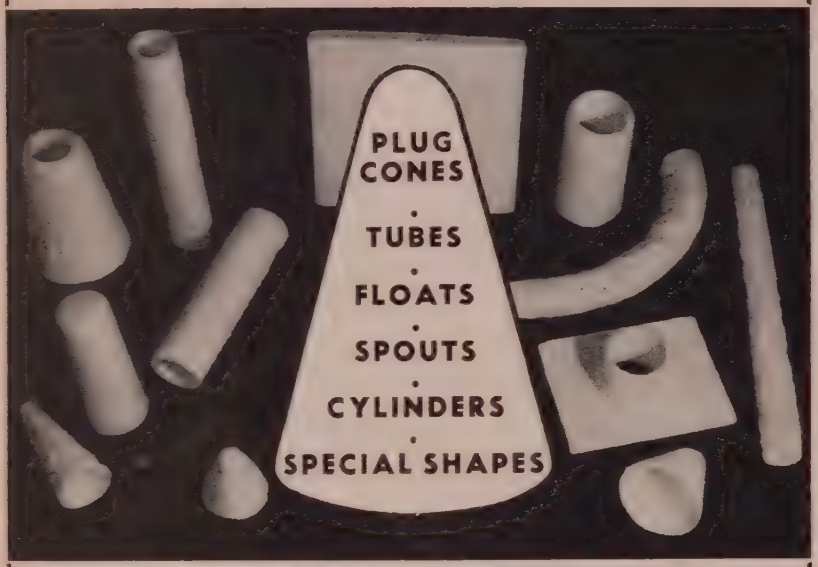

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been in existence several years. One, X8001, developed by Argonne National Research Laboratories, is now being evaluated in the field. Alcoa says its new alloys proved to have corrosion resistance superior to X8001.

In addition to corrosion resistance, aluminum is desirable as fuel cladding because it is transparent to neutrons — atomic fragments that bombard uranium fuel, making nuclear power possible. This characteristic first helped stimulate aluminum's present wide use in atomic energy projects.

Add Heavy-Duty Series To Floor Truck Line

A new heavy-duty series of platform trucks has been introduced by Magline, Inc., 1900 Mercer Street, Pinconning, Mich. The new models feature universal caster mounting plates and magnesium safety tread plate decks and are considered an important addition to the company's line.

New design features include: Universal caster mounting plates, permitting use of a wide variety of commercial or industrial running gear arrangements; deeper, heavier channel sections with smooth outer surface and rounded corners for mounting full perimeter rubber bumper; deeper handle sockets set into heavier channels that combine with reinforced corners and riveted deck and mounting plates to form a rugged corner assembly.

The new trucks are built in 1000-pound and 1200-pound capacities, and in 10 standard sizes, ranging from 24 by 26 inches to 36 by 72 inches.

Alcoa Plans to Hike Sheet Rolling Capacity

Plans to expand and modernize sheet mills at Davenport, Ia., and Alcoa, Tenn. — at a cost of $18 million — have been finalized by Aluminum Co. of America.

The firm said the investment was being made in anticipation of a sharp rise in demand for aluminum sheet products, as predicted by Alcoa marketing experts.

During the two-year construction program, $10 million will be spent at Davenport and $8 million at the Tennessee plant. Initial work will begin this summer.

This Alcoa program "is being launched with the dual purpose of achieving greater rolling capacity, and improved production methods through the utilization of recent technological advances," according to a company spokesman.

Many of the additions and improvements will be aimed at increasing the firm's ability to roll lighter gauge sheet, faster and in larger volume. Among the

equipment being installed at Davenport is a tandem 4-high cold rolling mill and accessories. A 4-high, 4-stand rolling mill has already been installed at Tennessee, and additional fabricating and supporting equipment will be added. The project also includes expansion of both plants' warehousing facilities.

Foil Insulating Ceiling Needs No Covering

A low-cost insulation designed for metal shop use where no permanent ceiling has yet been installed is being manufactured by Reflectal Corp., subsidiary of Borg-Warner Corp., Chicago.

The aluminum foil reflective insulation, called Alfol, does not need expensive extra supports such as backer board, lath stripping, wire, etc. It provides a handsome, maintenance-free ceiling, claims the firm. It adds that in many cases, an Alfol ceiling actually costs no more installed than a two-coat paint job.

Each Alfol blanket consists of aluminum foil layers that reflect 97% of all radiant heat and block heat by convection. The foil layers form reflective air spaces that hold conduction to a minimum. In addition, Alfol incorporates vapor proof backing to protect against condensation.

In buildings with wooden beam construction, Alfol is stapled across joist faces. In structures using steel beams, Alfol is stapled to wood furring strips. For standard bar joist construction, Alfol blankets are placed between joists, and then adjacent blankets are stapled together.

Spectrophotometer Use Speeded Up

Baird-Atomic Inc., Cambridge, Mass., has a new infrared double-beam spectrophotometer, Model NK-1, which can scan 2-16 microns in 4 minutes or less instead of the 14 minutes previously required, with no loss of resolution or accuracy.

In addition, the new design permits

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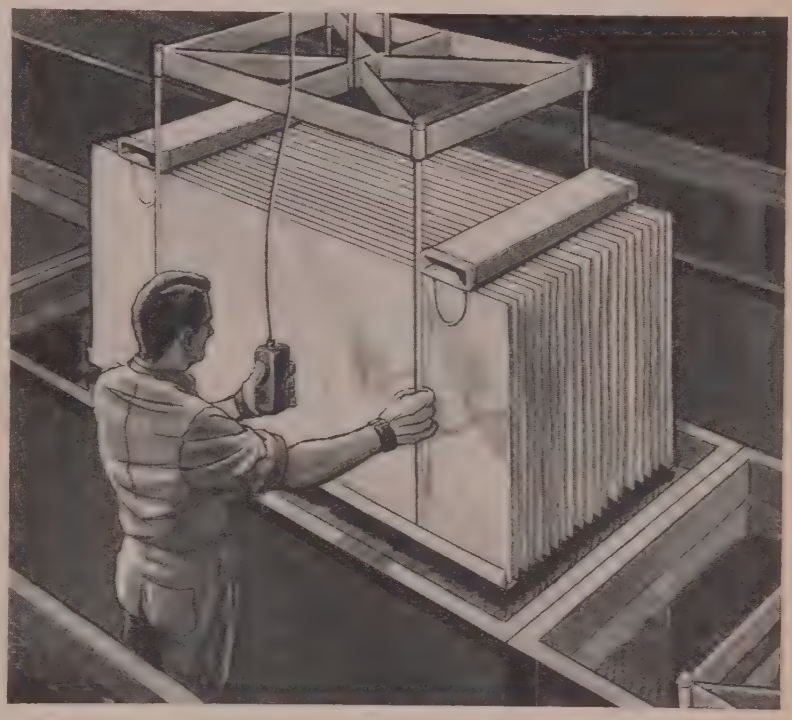

Stencil inks, shop soils disappear fast in Oakite Aluminum Cleaner 164

Here is a heavy duty yet perfectly safe alkaline cleaner for all aluminum alloys. Parts immersed in a tank of Oakite 164 emerge free of even the most tenacious identifying inks, greases and other shop soils. There's no etching at all.

Air agitation of this efficient, non-foaming solution speeds cleaning action, although Oakite 164 works efficiently even without this aid.

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a variety of accessories which broaden its capabilities, making it useful for research investigations. The large prism, wide globar source and bolometer detector combine to give high prism resolution, and maximum signal-to-noise ratio. Available attachments allow wavelengths from 0.2 to 38 microns.

The large sampling area permits use of many accessories and attachments, including a 20-meter gas cell, ultra-micro liquid and gas cells and a micro-beam condensing system. The new instrument comes in two models — the NK-1 with all advanced features, and the NK-1a, a lower priced model which can be expanded unit-wise to add to its versatility.

4000-Ton Extrusion Press To Serve East Coast

A 4000-ton press, said to be the largest self-contained aluminum extrusion press ever built, has been installed by Reynolds Metals Co. at its Grand Rapids, Mich., plant.

The press, expected to be operating before the end of the summer, will be used primarily to produce large tubular aluminum extrusions for eastern customers. Previously, east coast orders were filled from Reynolds' Phoenix, Ariz., plant.

Lake Erie Machinery Corp., Buffalo, N. Y., built the new press. It is operated by a compact oil-hydraulic system.

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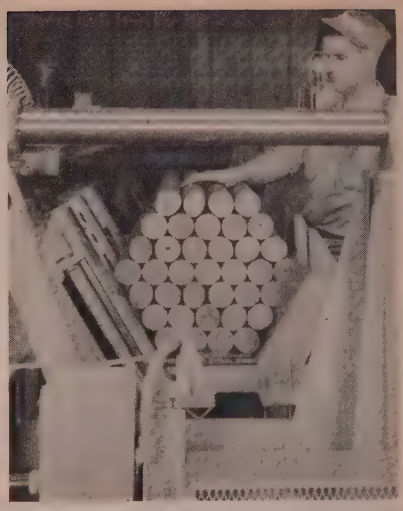

Automatic Billet Bundler Packs Round, Square Shapes

A wide range of piercing and extrusion billets and wire bars in a variety of metals can be packaged into uniformly shaped, tight bundles with a fully automatic bundling machine developed by Loma Machine Mfg. Co., New York.

By placing two machines in tandem, one bundle can be strapped, either manually or automatically, and discharged, while the next bundle is being built up in the other machine. Round billets are bundled in a hexagonal pattern (see picture), while the square wire bars are stacked in a square arrangement.

A powered roller conveyor feeds billets to the bundling machine. Here, each billet is picked up by a lifter and moved by loading levers into a transfer arm, which is operated by a templet which actuates an automatic program control.

Once the transfer arm stops, the loading levers are retracted and the billet drops into the cradle. The arm then repeats the cycle. The entire bundling mechanism is electro-hydraulically controlled and can be set for various billet sizes and stacking patterns by changing templets.

Refractory Stops Corrosion During Furnace Charging

Two brick refractories and a high-alumina mortar have been developed and are purported to resist corrosion and destructive impact during furnace-charging operations, and to avoid contaminants for meetig rigid aluminum alloy specifications.

Developer Harbison-Walker Refractories Co., 307 Fifth Ave., Pittsburgh 22, Pa., says these new products were subjected to extensive laboratory tests before they were put into commercial production.

"Reports on service performance show

that these products are easing the destructive impact accompanying furnace charging, retarding excessive corrosion of the furnace parts and most largely avoid contaminants which in minute amounts are undesirable," says the firm.

Alumina in stabilized crystalline form is the main constituent of the refractory brick, named Coral. In its several modifications for specific conditions, Coral is phosphate-bonded, chemically, or hard-fired with the phosphate bond or made with a ceramic bond developed by high temperature firing.

Coralbond mortar produced primarily for laying the brick has the same alumina content. It possesses the property of zero permeability by molten metal to a degree "not previously experienced with joint materials," says the manufacturer.

New Pig Design Makes Snugger, Safer Bundles

A new design for 50-pound pigs permits better, more secure bundling says its developer, Aluminum Co. of America.

The pigs now are flatter and have sloping sides for better fitting in bundles. Pigs also have cast-in side-by-side interlocking notches which, Alcoa says, holds the pigs securely in place. Bundles of the new pig are bound with four metal straps.

"Alcoa has spent several years of testing pig designs," comments G. H. Weiss, manager of pig and ingot sales. "We feel the new features will result in greater economy . . . because they make possible faster, safer loading and unloading."

Two bundles are offered. Parallel-stacked pigs, in a 2350-pound package, are for users who charge whole bundles into small furnace-door openings. This bundle contains 47 pigs and is only 30 inches high. Standard bundles are cross-stacked, weigh 2200 pounds, and contain 44 pigs. They are designed for fork truck handling, and are also stable enough for transfer by crane or slings.

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Aluminum Home Depicts U.S. Life at Foreign Show

At the Triennale di Milano, international design exposition which opened recently in Italy, an aluminum home designed by Alcoa serves two roles — it houses the United States exhibit, and is an important part of the display, itself.

Alcoa commissioned California designer John I. Matthias to develop a design for the Twelfth Triennale, whose theme is home and school.

The home uses extruded aluminum structural members and Alply sandwich panels for walls and roof. External panel surfaces are finished in white and gold, while internal panel surfaces are off-white or covered with fabric. Douglas fir, hemp fabrics and plastics are used inside.

The building itself is suspended above ground on aluminum channels, and is completely movable. At the close of the show in November, the house will be taken down, shipped to the U. S. and shown here.

The balance of the U. S. display comprises equipment, furnishings, and craft objects for family living, all selected by Walter Dorwin Teague Associates. Furnishings are new designs not previously seen in Europe.

Work of 30 designers, involving products of 27 manufacturers, is represented in the home structure and its furnishings. In addition, 16 craftsmen prepared a collection of decorative objects which were supplied through the American Craftsmen's Council.

Neither the house or the rest of the display are high cost items. All elements were chosen as within the means of an American family consisting of father, mother and 11-year-old son, with middle class income and background. The house covers less than 1000 square feet and has a kitchen and dining area, living room, two bedrooms and three outdoor patios.

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Men-on-the-move

Brooks & Perkins Inc., Detroit, leading designer and fabricator of magnesium and titanium products, has promoted **Donald L. Erickson** to the position of production manager of the company. He will be responsible for all activities directly connected with manufacturing operations. This includes production engineering, production control, purchasing and estimating. Erickson has been with B&P since 1946 and previous to this new assignment had been chief production engineer. He was formerly affiliated with Ford Motor Co., Goodyear Aircraft and Bell Telephone Laboratories.

J. E. Workman has been elevated to the presidency of Latrobe Steel Co., Latrobe, Pa., following the resignation of **M. W. Saxman,** who is continuing as chairman of the board. Saxman had served the company 36 years and was its president since 1940.

Roydon S. Pratt, staff technical director for the Bridgeport Brass Co., Bridgeport, Conn., has been named technical and research director. Pratt takes over the functions which had been supervised by **Raymond A. Quadt,** recently named president and a director of Reactive Metals Inc. Quadt remains a vice president of Bridgeport Brass, which manages Reactive Metals.

Glenn F. Bradley has been named superintendent of operations of Reynolds Metals Co.'s Listerhill, Ala., reduction plant. The former plant engineer joined the firm in 1950.

The Dow Metal Products Co., Division of the Dow Chemical Co., Midland, Mich., has appointed **Wesley H. Hauschildt** as chief production engineer for aluminum operations in the Foundry Dept. of its Bay City, Mich., plant. In this position, Hauschildt will have production responsibility for aluminum sand and permanent mold castings.

New Testing Generator Framed With Aluminum

A new generator for surge power current testing has an aluminum framework that includes six platforms 14 feet high which support 12,000 pounds of capacitors. It was designed and fabricated by Joslyn Mfg. & Supply Co., 3700 S. Morgan, Chicago.

Employing the standard Marx circuit, the generator has an energy rating of 45 kilowatt-seconds. Output voltage may be 300 or 150-kv, and on short circuit it will deliver 90,000 and 125,000 amperes respectively.

The generator was designed to provide necessary currents for making discharge currents withstand tests on lightning protective devices, and to serve as initiating generator for duty cycle or power follow tests.

Aluminum was used for framework to simplify fabrication and meet floor loading limitations says Kaiser Aluminum & Chemical Co., who supplied the metal. Electrically, aluminum was selected because of its high conductivity and nonmagnetic properties. Total weight of the framework is 20,000 pounds.

Aluminum Fire Escape Made For Two-Story Residences

A new fire escape for two-story homes, permitting escape from both the first and second floors, is being manufactured of structural aluminum sections by the Fyre-Flite Div'n of Mardigian Corp., 770 Spruce St., Wooster, Ohio.

The aluminum escape is said to conform with any architectural style. It fits any two-story residence or building and is stored in a retractable column, requiring no more space than a downspout against the side of the structure. The unit unfolds by turning knobs.

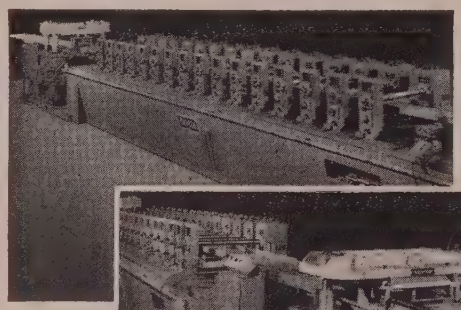
Stress analysis tests by an independent laboratory showed that the unit can safely hold eight persons averaging 180 pounds each. Four models come in lengths from 16 to 24 feet.

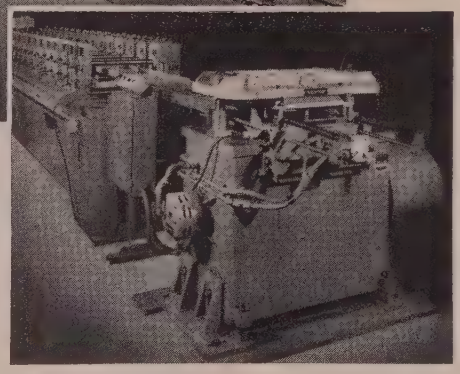
New Pickling Compound Developed for Castings

A new non-fuming pickle for aluminum castings, Kenvert No. 45, has been introduced by Conversion Chemical Corp., 101 E. Main St., Rockville, Conn. The manufacturer claims that the compound can produce a much whiter casting than heretofore available.

Kenvert No. 45 is a powder added to 42° nitric acid to form a stable operating solution. When in use the solution does not heat up or give off brown nitrogen oxide fumes. The work does not fume during transfer. Long immersion times produce snow white castings, the company asserts. With conventional nitric-hydrofluoric pickle, on the other hand, the casting turns grey if left in too long, the solution gets hot, and copious nitrogen oxide fumes are evolved.

Kenvert No. 45 can be used after an alkali etch to whiten and selectively remove free silica on the surface of castings prior to anodizing, ball burnishing, chromate conversion coating, or plating. It is available in 100 lb. and 400 lb. drums, and can be ordered through distributors throughout the U. S. It is manufactured under license in Canada and England.





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Looking Ahead

United Pacific Aluminum Corp. will become the seventh domestic producer of primary aluminum — if the Bonneville Power Administration approves the Los Angeles-based firm's application for enough firm power to run at least one potline. As of this writing (July 11), there had been no word on Bonneville's decision on United Pacific's bid — or on that of half a dozen other applicants for a new block of industrial power in the Pacific Northwest. If the power is granted, United Pacific plans to start building a smelter at Longview, Wash., late this summer; hopes to have one of the two planned potlines running by late next year.

Details of the new smelter are scarce. Governor Rosellini of Washington revealed that it would cost "over $10 million." This sounds low; with a capital cost of at least $1000 per ton of installed capacity (probably more), the Governor's figure would finance, at best, 10,000 tons of capacity. This is less than half of the capacity traditionally considered necessary for an efficient primary reduction works in the U. S. Another dubious point is the announcement that United Pacific would use "bauxite imported from Australia, Africa and the Orient." This would mean that alumina facilities would be needed — making that $10 million look all the smaller.

If you judge aluminum prosperity on the basis of primary production, you get the idea that the industry is enjoying the biggest boom in its history. In fact, when you compare current aluminum production with that of nearly any other basic material, you might even conclude that aluminum is almost immune to the current slump in demand for materials. With primary production now cruising at a 2.4-million ton annual clip, shipments to users this year may total 2.7 to 2.9 million tons (after adding imports and secondary). Of course, not all of the primary metal goes to domestic users, what with exports amounting to about 350,000 tons a year. Still, domestic sales of aluminum could rack up a 10% gain over 1959.

Although aluminum output and sales are up by any yardstick, profits leave something to be desired. "The more you sell, the more you lose," claims one producer. It's no secret that some producers are reaping a good profit on raw metal, but are having a helluva time breaking even on fabricated products. Just recently, Alcoa slapped a half-cent-a-pound increase on building sheet — the same stuff that trimmed several cents off the price of aluminum sheet just a few months ago. Seems that Alcoa concluded that it had been losing money on building sheet. What's more, too many users were ordering small quantities of the stuff for many products that were not intended to be building sheet markets. (We vaguely recall speculating to this effect in our article on the subject last December.) It is reported that a big maker of climate control equipment is trimming its materials costs by switching every possible part from steel to building sheet; even reaps a sizeable saving after paying the duty on sheet used by its Canadian plant.

Aluminum foundries and die casters should smell trouble in the recent announcement that a British company will supply at least $1.4 million worth of leaf springs for Ford's fast-selling Falcon. This is probably the first time Ford has contracted to buy such parts from foreign suppliers, but spies tell us that Ford is thinking of buying some aluminum engine parts from Germany in 1961. Add this to the growing list of industries that are cutting costs by buying from overseas suppliers, and you get the idea that the smart labor leader of the future will be the one who realizes that the "automatic" wage increase (i.e., the one that does not follow an increase in productivity per manhour) can be the American wage earner's worst enemy.

In somewhat the same vein, we note that Alcoa plans to close its aluminum foundry in Bridgeport, Conn., and move the operations to other company plants during the next year or so. The move will put some 300 employees out of work. Alcoa characterized the move as necessary for efficiency and customer service; pointed out that the market for castings is still good. Still, we wonder if sand and permanent mold casting isn't getting to be too tough a business, even for a company with Alcoa's resources.

In the wake of Southern Railway's order for 1205 aluminum freight cars (see article on page 76) come unconfirmed reports that two western roads and an eastern one are negotiating for aluminum freight cars. If true, this bears out the oft-stated idea that all the aluminum industry needed to crash this huge market was for one or two sizable roads to take the plunge with aluminum.

Stock market is in another of its "ain't going nowhere" periods. But some of the aluminum stocks are not doing too badly. One new issue that was gobbled up quickly — and at a good price — was the block of 750,000 shares that Harvey Aluminum put on the market last month. This offering — Harvey's first — was over-subscribed in a hurry. Harvey is said to be dickering with Bonneville Power Administration for 60,000 to 75,000 KW of firm power plus 95,000 KW of interruptible power. Reason: Harvey wants to double its primary aluminum capacity by building a new smelter in Washington or Oregon.

— The Editors

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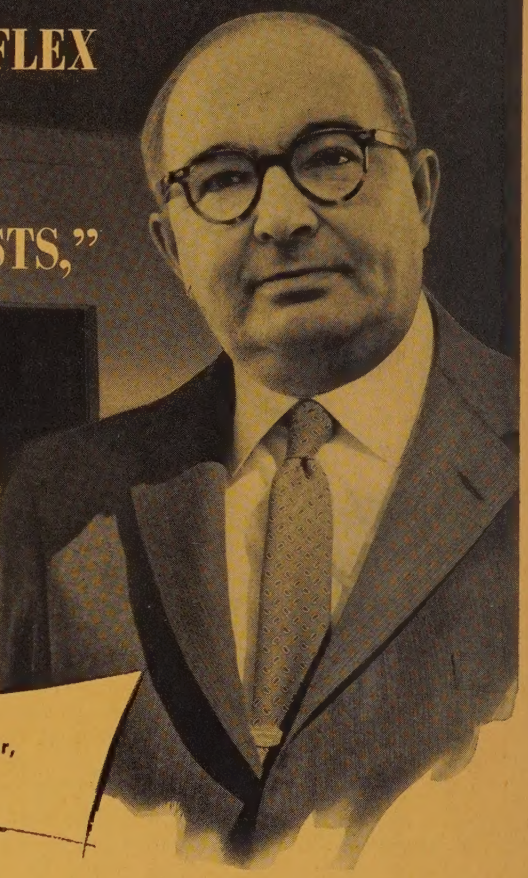

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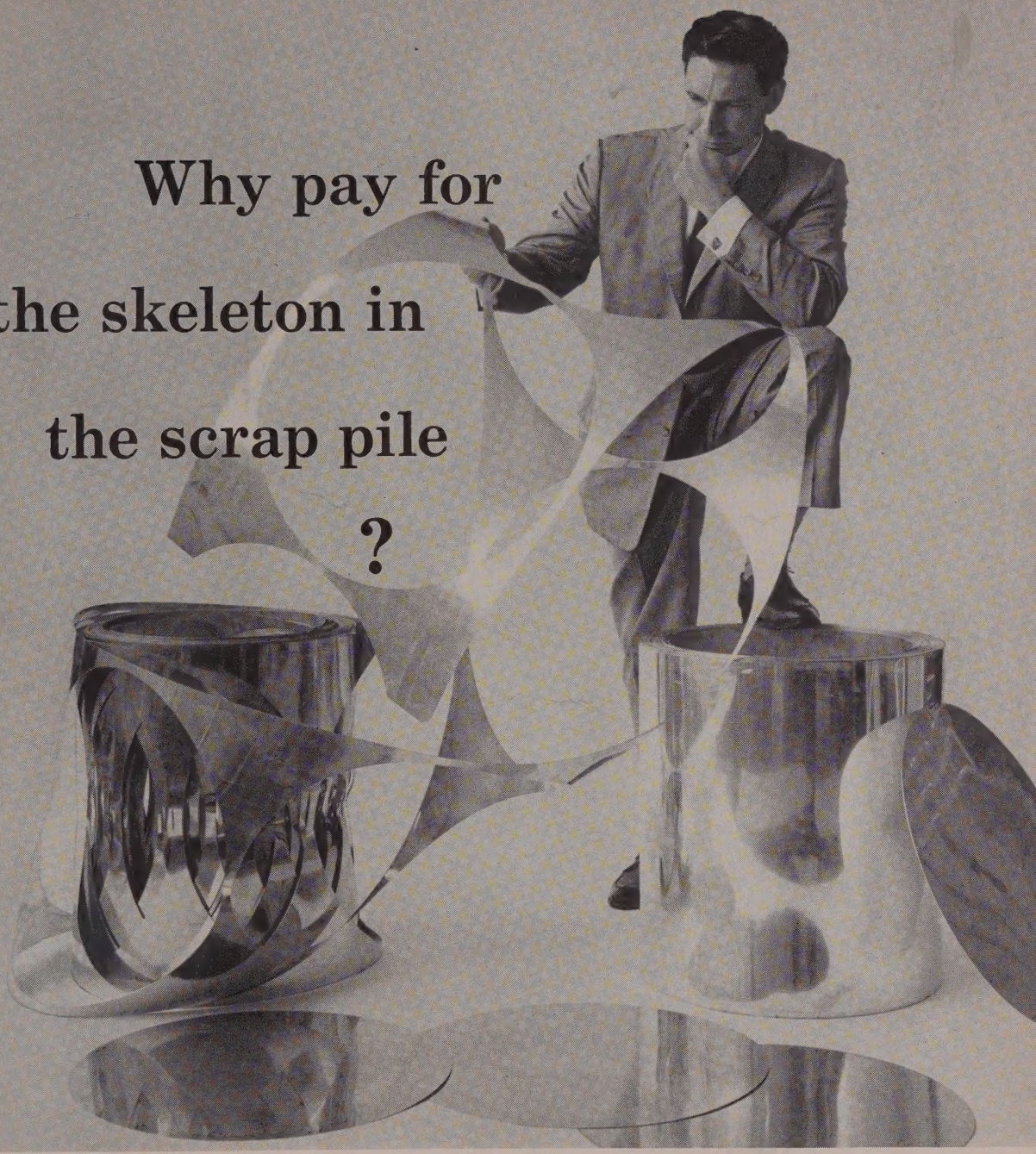

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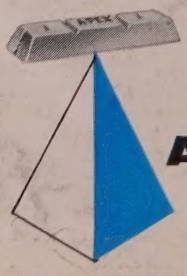

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